The RUBBER AGE

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LATE NEWS of the Industry

Firestone Tire & Rubber Company Cuts Common Dividends to $1 a Year Basis

DIRECTORS of the Firestone Tire & Rubber Company, meeting last month, declared a quarterly dividend of 25 cents on the common stock, placing it on a $1 annual basis, against $1.60 previously. The dividend is payable October 20 to stockholders of record at the close of business on October 5.

Harvey S. Firestone, president of the company, stated that the cut in the dividend rate was believed by directors to be in keeping with present conditions and was designed to conserve the company's strong cash position. Since the announcement of the dividend cut, Firestone common stock has sold down to a new low of 15½ on the New York Stock Exchange, as compared with its 1930 high of 33⅛ and with the peak 1929 price of 309 for the old common stock, equivalent to about 62 for the new common. The 6 per cent preferred stock has also dropped back to a new low of 60, comparing with its 1930 high of 87⅞ and its 1929 peak of 98¾ when first issued.

No statement was issued in regard to what may be expected in the financial report for the fiscal year ending October 31, but it is believed that a deficit will be shown after the payment of dividends. For the six months ended April 30, the company showed net profits of $2,320,118 after deducting depreciation, interest, federal taxes and all other charges, including Liberia development expenditures. This was equivalent after dividend requirements on the 600,000 shares of 6 per cent preferred stock to 23 cents a share (par $10) on the 2,239,860 shares of common stock.

The company's sales total for the period was not revealed in the report. Inasmuch as the company has not in prior years issued semi-annual statements, there is no comparative figure for the corresponding period in 1928-1929. During the full year ended October 31, 1929, the company earned $7,726,870 after similar deductions. In connection with the issuance of its 600,000 shares of new preferred stock last fall, it was announced that the company had earned $6,016,527 in the ten months ended August 31, 1929.

The Firestone Tire & Rubber Company has continued to expand this year through the completion of its new storage battery plant, through adding brake lining to its products and through extending further the number of one-stop service stations in which it has a financial interest. Reports that the company would enter the wholesale gasoline field have been denied, although it does distribute gasoline like an oil company in two cities, one in West Virginia and one in North Carolina. In each of these cases, the company into which Firestone bought was a gasoline and oil distributing company with a set-up for selling tires and other automobile needs. The total number of service stations in which Firestone is now financially interested is understood to be between 300 and 400.

Department of Commerce Now Analyzing Semi-Annual Tire Dealers' Stock Survey

THE Department of Commerce, through the Rubber Division of the Bureau of Foreign and Domestic Commerce, has sent out to nearly 100,000 tire dealers throughout the country questionnaire forms for its semi-annual survey of stocks of tires and tubes. Returns showing the conditions of inventories among dealers on October 1 are now being received by the department and are being tabulated so that a preliminary report may be issued about October 20 and the final report soon thereafter.

By ascertaining the size of the available tire stocks through the country, the report drawn from this survey will serve as a guide for manufacturers in planning their production schedules for the next six months and will also develop a great amount of useful information for the dealers. The Department of Commerce is making its usual efforts to keep its mailing list as accurate as possible, and has removed the names of several hundred firms that have gone out of business and added hundreds of other new firms. Manufacturers are urged to encourage their dealers in every way possible to answer these questionnaires, and the National Tire Dealers Association has also co-operated to secure a large return from among its own membership.

It is generally expected in trade circles that the current business depression has resulted in dealers' stocks being appreciably reduced and that the survey will, therefore, show inventories well under last year's totals. As of October 1, 1929, the survey showed that 25,417 dealers had 1,739,043 casings, an average of 68.4 per dealer, comparing with averages in 1928 of 64.8 and in 1927 of 57.6. While the stock figures of October 1 are not strictly comparable to those compiled as of April 1, the survey taken on that date this year showed that 30,717 dealers held 2,550,222 casings, an average of 83 per dealer.

John L. Julian Named for Presidency Of the Rubber Exchange of New York

AFTER serving five consecutive terms, Francis R. Henderson, of the F. R. Henderson Corporation, is relinquishing the presidency of the Rubber Exchange of New York in order to devote more time to his growing business in crude rubber. Mr. Henderson, who has acted as president of the exchange since its organization in 1925, will be succeeded by John L. Julian, a partner in the well known cotton firm and New York Stock Exchange house of Fenner & Beane, who has been named by the nominating committee for that office.

J. L. JULIAN

Mr. Julian, a native of Tuscumbia, Ala., has specialized in cotton during his association with Fenner & Beane, but has been a member of the Rubber Exchange since 1926 and is now serving on the board of governors, the executive, supervisory and commissions committees. He is a resident of New York City.

William A. Overton, who is with Geo. H. McFadden & Bro., was nominated for vice-president and J. Chester Cuppia, of E. A. Pierce & Co., renominated for treasurer.

Three new members were named for the Board of Governors and nine of the present members renominated. The new candidates for the board are Robert L. Badenhop, of Robert Badenhop Corporation; Hutcheson Page, of Rogers, Brown & Crocker Bros., Inc., and Charles Slaughter, of Slaughter, Horne & Co. Those renominated for the board follow:

Harold L. Bache, William E. Bruyn, James T. Bryan, Herbert S. DeLane, J. Frank Dunbar, Jr., Francis R. Henderson, Jerome Lewine, Fred Pusinelli, Edward J. Wade.

Frank D. Pressinger, R. L. Chipman and LeRoy Wood were named for inspectors of election. The election will take place October 21.

Tire Manufacturers' Conference Adopts New Advertising and Selling Standards

MEETING at a special conference at Akron, O., on September 16 under the auspices of the National Better Business Bureau, Inc., representatives of six leading tire manufacturers and two national tire distributors agreed to adopt a new code of advertising and selling practices. In addition to those present at the conference, thirteen other tire manufacturing companies have signified their intention of adhering to the standards laid down.

The standards agreed upon are embodied in the following resolution, which was signed by the representatives of the companies present at the Akron meeting:

"Whereas, tire manufacturers and distributors adopting the following standards agree that it is their desire to promote voluntarily fair play methods of competition in advertising and selling practices, and

"Whereas, it is further agreed by tire manufacturers and distributors adopting these standards that they desire and will welcome the cooperation of the National Better Business Bureau, Inc., as an agency of assistance in carrying out the purposes of these standards, and toward this end it is agreed by each manufacturer and distributor that the compliance of his firm to the standards shall be sincere and complete, and

"Whereas, tire manufacturers and distributors adopting these standards agree to cooperate fully with the National Better Business Bureau, Inc., in the voluntary maintenance of these standards;

"Therefore, be it resolved that the following standards be adopted to govern the advertising and selling of tires:

1. Tire advertising shall not be deceptive or misleading to the consumer, or disparaging to competition.
2. Tire manufacturers and distributors will submit proof of claims made in advertising upon request of the National Better Business Bureau, Inc."

Firms represented at the Akron conference and agreeing to the action taken included the Fisk Rubber Company, General Tire & Rubber Company, B. F. Goodrich Company, Goodyear Tire & Rubber Company, Montgomery Ward & Company, Sears, Roebuck & Company, Seiberling Rubber Company and United States Rubber Company.

Other manufacturers who were not represented at the meeting but who indicated their willingness to adopt fair standards of practice are the Armstrong Rubber Company, Corduroy Tire Company, Cupples Company, Dayton Rubber Manufacturing Company, Dunlop Tire & Rubber Company, Falls Rubber Company, Gillette Rubber Company, Hamilton Rubber Manufacturing Company, Lee Rubber & Tire Corporation, McCreary Tire & Rubber Company, Norwalk Tire & Rubber Company, Pharis Tire & Rubber Company and Standard Four Tire Company.

B. F. Goodrich Company Current Assets Reported at $102,278,000 on August 31

THROUGH a special statement issued last month, the B. F. Goodrich Company announced that its current assets as of August 31 totaled $102,278,000, compared with current liabilities of $17,091,000, a ratio of approximately six to one. The excess of $85,187,000 is more than $22,000,000 above the total funded debt of the company and its subsidiaries. Cash alone amounted to $13,954,000.

The August 31 inventory of $50,605,000, in which raw materials were taken at the lower of cost or market, represented a reduction of $1,600,000 compared with June 30 of this year. The company expects that a substantial part of its finished goods can be liquidated before the end of the year at prices which will be equal to or greater than inventory cost. The company has not drawn on its reserve previously created for raw material commitments.

The management reports that in recent months it has made substantial reductions in production and distribution costs and that, with its strong cash position, it is well placed to take advantage of the current low prices of crude rubber and cotton. The company expects to benefit by the entry of leading oil companies into the retail tire field through the opening of important additional outlets for its tires.

For the first six months of 1930, Goodrich reported a net loss of $1,292,906, resulting in a total deficit of $4,638,096 after common and preferred dividends. Dividends were subsequently passed on the common stock, and these shares, which had sold as high as 105¾ in 1929 and as high as 58½ this year, have dropped to a low of 18⅜.

The company in May sold an issue of $30,000,000 convertible 6 per cent fifteen-year debentures, with the privilege of conversion to common stock at prices ranging from $65 a share upward. These debentures have since declined to a low price of 78½ and are now selling slightly above 79.

New York Rubber Group, A. C. S., to Meet For First Fall Session on October 23

MEMBERS of the New York Group of the Rubber Division of the American Chemical Society will hold their first fall meeting in the silver grill room of the Hotel Lexington, 48th Street and Lexington Avenue, New York City, on the evening of October 23. An interesting program of papers will be presented.

H. G. Bimmerman, of E. I. du Pont de Nemours & Company, will read a paper on "Control of Uniformity of Press Cures." Harlan A. Depew, of the New Jersey Zinc Company, will discuss "Accelerated Discoloration Tests for White Rubber Products and Methods of Measuring Extent of Discoloration." Following these technical papers, A. A. Somerville, of the R. T. Vanderbilt Company, will give an informal talk on his recent trip to Russia.

The meeting will be preceded by a dinner, tickets for which will cost $2.50 each. Reservations should be made immediately through K. J. Soule, secretary-treasurer of the group, in care of the Manhattan Rubber Manufacturing Division, Raybestos-Manhattan, Inc., Passaic, N. J.

Faultless Rubber Company Net Profit Is $368,273 During 1930 Fiscal Year

DESPITE the current depression in certain branches of the rubber industry, the Faultless Rubber Company, Ashland, O., manufacturer of molded goods and drug sundries, has reported for its 1930 fiscal year net income before taxes of $368,273 as compared with $131,940 in the previous year.

On November 15, 1929, the Faultless Rubber Company called in all of its outstanding preferred stock to the amount of $493,300, placing its common shares in the place of priority in the matter of dividends. Dividends on the common stock were at that time increased to a rate of $2.50 a year, as compared to $2 basis which had prevailed since October, 1925. Additional common shares were also sold last fall at $30 a share on the basis of 16 for each 100 then held by stockholders, this financing bringing nearly $300,000 into the treasury of the company.

Directors of the Faultless Rubber Company have declared the regular quarterly dividend of 62½ cents a share on the common stock, payable January 1 to stock of record at the close of business on December 16.

Seiberling Rubber Company Licenses Avon Firm to Make Tires in England

NEGOTIATIONS have been completed by the Seiberling Rubber Company, Akron, O., with the Avon India Rubber Company, Ltd., Melksham, Wiltshire, England, under which the English company is to have exclusive right to manufacture and sell Seiberling tires in the United Kingdom and the Irish Free State.

The brand name of the British-built Seiberlings will be Avon-Seiberling Tyres. The technical knowledge, methods, organization and tire-making processes of the two companies are to be pooled and utilized in their common interest.

"Until the operation of the McKenna duty, Seiberling tires sold freely in Great Britain," Frank A. Seiberling, president, said. "The high tariff imposed thereby has made it advisable to manufacture our product in England, and the Avon company being one of the leading manufacturers in the United Kingdom, provides an excellent connection."

William S. Wolfe, vice-president and factory manager of Seiberling, is now in Great Britain completing plans for early installation of necessary manufacturing equipment.

Other Seiberling foreign manufacturing operations include the recently announced alliance with Gummiwerke Fulda of Fulda, Germany, which now is in full operation and the Seiberling Rubber Company, Ltd., of Canada, which has been in operation for three and a half years.

U. S. Rubber Is Reported Negotiating To Buy Samson Tire and Rubber Company

NEGOTIATIONS are reported to be in progress between the United States Rubber Company and the Samson Tire & Rubber Company, looking toward the merger of the tire interests of the two organizations. According to newspaper reports, Los Angeles interests in the Samson company have confirmed the first Eastern rumors that such a deal was under way. A. Schleicher, president and founder of Samson, has been in the East for the past few weeks.

The United States Rubber Company has no plant of its own on the Pacific coast, although the other three of the country's four largest tire and rubber companies have Los Angeles factories. The Samson Tire & Rubber Company has a capacity of about 10,000 tires a day at its plants located in Los Angeles, Compton and San Diego. The company's new plant on Telegraph Road, Los Angeles, has a daily capacity of 6,000 tires and 10,000 tubes.

The common stock of the Samson company has been moving steadily upward on the Los Angeles Curb Exchange, reaching a new high at $8 in the latter part of September. This movement was attributed to the merger negotiations, possibly to an expected offer of one share of United States Rubber common for every two shares of Samson.

Generally regarded as the pioneer tire manufacturer of the Pacific coast, the Samson firm has enjoyed a rapid growth. Organized in 1917, the concern by 1925 had gross sales of $4,066,453, with net profits of $415,345. In 1926, sales were $6,316,840, with net profit at $124,705 after inventory write-offs of $366,917. In 1927, sales and profits were $6,588,075 and $424,716, respectively. For the eleven months ended November 30, 1928, sales amounted to $7,605,410 and profits were $225,425.

Holt Returns to Rubber Division

Everett G. Holt, who resigned as chief of the Rubber Division of the Department of Commerce last April to become manager of foreign and crude rubber research for the Goodyear Tire & Rubber Company, has returned to his former position. Mr. Holt has been chief of the Rubber Division since 1926 and for the five years previous to that was assistant chief and administrative assistant. Prior to his entrance into work with rubber, he acted as principal of Clinton High School in Clinton, Me., his native town, from 1915 to 1917 and served as clerk, examiner and assistant chief of the Examining Division, United States Civil Service Commission, from 1917 to 1921. He was graduated from Colby College in 1915 with the degree of Bachelor of Arts and from George Washington University in 1921 with the degree of Bachelor of Laws.

(Other news of the industry will be found on Pages 33-39)

A FOREMAN'S OPPORTUNITY

Is in the Key Position to Reduce Accident Frequency—Safety Measures—Analysis of Accide

By W.
Superintendent of Produc

DURING the last few years the rubber industry has experienced increased competition which has resulted in decreased profits. This has entailed a careful scrutiny of every item of expense. Campaigns for the elimination of waste and prevention of accidents are in progress. Selecting and training of efficient labor has become more necessary. The research and development departments are expanding their activities. Efficiency departments are doing a more extensive work. These activities along with many more are helping to keep the different concerns on a competitive basis. In order to accomplish the best results a spirit of cooperation is necessary. To help develop this cooperation personnel department activities have been enlarged. Employees representation plans have come into use and the employees are being considered as individuals instead of in a mass. Industrial universities are furnishing the opportunity for better education. Employees activities fostered by the companies are helping to provide the necessary recreation and good-fellowship. Whether these activities originate at the top or the bottom of the organization, their interpretation and execution rest with the foreman. This places the foreman in a key position and gives him the opportunity in accident prevention. Opportunity is nothing more than acceptance of responsibility.

An analysis shows that approximately fifteen per cent of the accidents are due to mechanical causes while the other eighty-five per cent are due to causes ordinarily termed carelessness. From these figures it becomes apparent that the real problem is to teach the employee to think, talk, and act safety-first. Every organization reflects its head and it is no exception for the department to reflect its foreman. It is a proven fact that in order to be a good teacher a foreman must be respected by his employees for his knowledge, discipline, human understanding, fairness, and consideration for others. When a foreman attains this position he becomes a leader and the employees are anxious to follow his directions and discuss them with others. A foreman can only accomplish so much in a day's time, but by enlisting all of his employees as his representatives, you can multiply his accomplishments by the number under his direction and measure the results accordingly. To develop this to the maximum he must be open-minded to and encourage suggestions, thereby keeping the employees thinking about constructive things so they have no time for petty, manufactured grievances. He must also be willing to admit his mistakes and appear human in the eyes of his employees.

EDITOR'S NOTE: This paper was presented before the National Safety Congress, Pittsburgh, Pa., October 2, 1930.

Main Operating Room in Hospital at Goodyear Tire & Rubber Company, Akron

Knowledge of Machines Essential

The present age is termed the machine age. Inventions of semi and automatic machinery have come so rapidly that the human mind is having difficulty understanding the very machines which it has invented. The foreman who makes a thorough study of the machines in his department finds he is more capable to teach the safe use of these machines to his employees. He can point out to the new men and continually caution the more experienced men, the dangers in operating the various machines. Also explain the various safety devices and their functions. The important thing is to teach these things in time to prevent an accident, not to put it off until the accident has happened.

The foreman from the nature of his work is in close and intimate contact with his men and operations which gives him an opportunity to study them. This enables him to place the men on the job for which they are best suited. He must know whether they are mentally and physically qualified to efficiently turn out a quality product in a safe manner. In addition to knowing his men, he must have experience and knowledge of the various jobs under his jurisdiction as well as the materials and equipment used in the various operations.

Handling New Employees

As new men are employed or transferred from other departments, the foreman has the opportunity of being the first to meet them and create a good or bad impression on the newcomer. In small departments, he introduces them to their new job and looks after their instruction, which should include the danger points in each operation and the

Th ACCIDENT PREVENTION

uency ch Depends on His Interpretation and Execution of ccide Classes in the Goodyear Factories

W. EMING
Product t II, Goodyear Tire & Rubber Co.

practical knowledge of the safety methods applied. In larger departments this function is delegated to someone else, either directly or indirectly responsible to the foreman, but he still has the opportunity to see that the proper instructions are given. The first impression is generally a lasting one and if the foreman can gain the confidence of the newcomer he should have little difficulty in making him appreciate the need for safety.

Must Practice What He Preaches

No foreman can impress upon an individual the importance of safety unless he practices his teachings in his department. It is useless to teach a man safety methods if the department in which he is working is full of unnecessary hazards. A floor in need of repair is as dangerous as an unguarded machine. A well ventilated department is essential to clear thinking and accident prevention. The lighting should be given careful consideration in regard to both location and kind of lighting used. The need for cleanliness becomes apparent when we consider the dangers arising from tools and materials allowed to lay around the department. Even though a foreman has taught his men and has conscientiously practiced these teachings, his opportunity as a leader is by no means ended. He must continually check for unsafe practices such as chance taking, unnecessary haste, and hazardous shortcuts. This applies more to the experienced employee than to the new man because the dangers have become commonplace to him. When he notices that the men are inclined to be less careful, he must arouse their interest and enthusiasm by means of contests, suggestions, and educational meetings.

Falling Material Causes Most Accidents

In order to plan the most effective educational program it is necessary to study the problem as it actually exists. As a basis, we will take the record of the causes for accidents and their percentage of the total accidents in the Goodyear Tire & Rubber Company since January 1 of this year. Taking the items in their order of importance, we first have falling material which is nineteen and nine-tenths per cent of the total accidents. This consists of material falling from tables, machines, ladders, improper piling, etc. In this class of accidents the careless operator is often hurt, but more frequently it is someone else. While working, he carelessly piles his tools or materials on this table, bench, or machine and while reaching for some specific item pushes another off, striking some part of his body. An accident of this kind can be easily avoided by an orderly kept bench. While working on a ladder it is very easy to lay down a tool and with a little push cause it to fall on someone passing near the ladder. Storing of materials requires considerable study in order to utilize floor space to the best advantage and pile the material so it will not topple over. Every factory has considerable vibration which has a tendency to shift materials, sometimes causing a whole pile to fall.

The next item in importance is handling material, which is nine and seventy-seven hundredths per cent of the total accidents. This item covers the loading and unloading of materials and machines, and transporting them from place to place. While handling, the employee may drop his load and crush a foot or he may stumble while carrying it and break an arm or cause it to fall on someone else. In putting down his load, it happens quite frequently that he fails to remove his fingers before letting the load completely down and the result is an injured finger.

Falls make up eight and eight hundredths per cent of the accidents. This covers stairs, tripping, overbalance, slippery floors, bumping against machines, etc. Horseplay, unnecessary haste, and awkwardness are responsible for most of the accidents in this group. The foreman should see that the stairwells and main aisles are well lighted, free from obstruction and clean. Then it becomes a matter of discipline for which the foreman is responsible.

Trucks are responsible for seven and six-tenths per cent of the total accidents. Conveyors are replacing them to a considerable extent but a great deal of material is still handled by hand and electric trucks. Employees turn corners without looking and are bumped by them. Electric truck drivers fail to signal dangerous places. Operators pushing trucks occasionally get squeezed between their trucks and other objects, and also pull them so the wheels run over their feet.

Employees often cause injury to themselves by trying

Compounding Room, Goodyear Tire & Rubber Company, Akron. Arrows point to Safety Stop on Mill

to lift loads that are too heavy and by not knowing the proper way to lift. This causes strained backs, hernia, fallen arches, and torn ligaments. The seriousness of these accidents is difficult to determine and they are responsible for seven and eleven hundredths per cent of the total accidents.

Each man should know the condition of the tools with which he works and when he is not conscientious in seeing that they are in proper repair accidents are the result. Hammer heads fly off the handle, rounded hammer heads cause smashed fingers, broken handles on rollers permit the rollers to drop on the man's feet and any tool in need of repair may prove itself a dangerous weapon. Accidents due to this cause make up seven and nine-tenths per cent of the total accidents.

At frequent times there are accidents that can not be classified. These we will call miscellaneous. They cause six and nine-tenths per cent of the total accidents.

Eye accidents cause six and sixty-three hundredths per cent of the total accidents. A man gets a foreign body in his eye and is careless about having it removed, and this starts infection. Most of these accidents are caused by negligence in not using goggles which are provided by the company in performing operations which require chipping, grinding, welding and burning.

Prompt Attention to Minor Injuries

It is difficult to educate the employee to the importance of giving immediate attention to even the smallest scratch. Some feel it is childish to go to the hospital for the treatment of an injury which is giving them no pain while others do not want to lose the time from their job and apply home remedies. Neglected minor injuries which result in infection cause five and seventy-nine hundredths per cent of the total accidents.

Employees not looking where they are going or what they are doing bump different parts of their bodies against doors, materials, and building causing bruises, fractures, sprains, and cuts. These accidents generally take place when the employee does not have his mind on what he is doing and are responsible for four and fifty-eight hundredths per cent of the accidents.

Tire and other miscellaneous machines cause eight and thirty-two hundredths per cent of the total accidents. Operators get their clothing or some part of their body in contact with the moving parts of the machine often causing very serious injury. Hoping to save time they change from one operation to another without stopping their machine. Mechanics sometimes try to repair a machine without interrupting the operation. These dangerous practices should be prohibited by the foreman.

Hazards in Curing Process

Rolling and handling molds in the curing process presents a serious hazard at all times. The percentage of accidents, which is two and seventy-seven hundredths of the total, does not express its true seriousness as accidents due to this cause are rarely minor ones.

Everyone has experienced the pain of a burn and can fully appreciate why accidents of this type should be reduced to a minimum, and yet they constitute two and fifty-three hundredths per cent of the total accidents. The majority of these take place in the mechanical departments where the men are working with electricity, steam, and hot metal.

With the large number of mills and calenders in operation the percentage of one and sixty-eight hundredths per cent of the total accidents is comparatively small; however the majority of these mean a badly crushed hand or arm. Every precaution possible should be used in their prevention.

One and thirty-two hundredths per cent of the accidents are caused by men stumbling over or bumping material laying around on the floor. This is one type of accident which is absolutely unnecessary if the foreman maintains an orderly department.

Carelessness Causes 85% of Accidents

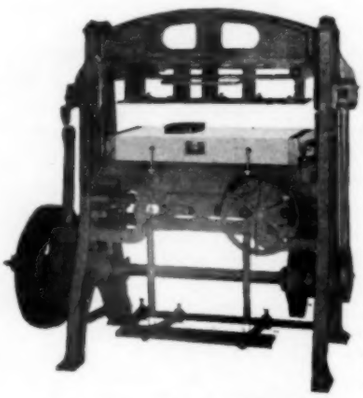
Presses are responsible for two hundredths per cent of the accidents. Though few in number these also may be very serious accidents such as burnt and crushed arms.

Going over the accidents in detail should make a foreman plainly see that he has a definite opportunity in accident prevention. With fifteen per cent of the accidents due to mechanical causes and the other eighty-five per cent due to causes ordinarily termed carelessness, the major part of the foreman's responsibility lies in the education of those responsible to him.

Laflex Cutting Blocks

THE accompanying illustration shows the new "Laflex" cutting block recently developed by the fibre products department of the United States Rubber Company. This cutting block, made from Laflex sheets manufactured in the Cleveland plant, is replacing a large number of wood and paper fibre cutting blocks throughout the shoe, rubber, cloth and general textile industries.

Laflex is an exclusive United States Rubber Company product, a combination of cotton cellulose and rubber latex.



Laflex Cutting Block—the Block Is the Light-Colored Oblong Object in the Bed of the Machine

Recent experiments have proved that Laflex sheets can be bolted together in an upright position and shaped into cutting blocks. The blocks thus formed possess many features not found in any other block. One of the great advantages of the Laflex cutting block is that the large rubber content permits of the block being self-healing, that is to say, when the sharp edge of the cutting tool enters the block and emerges, the cut so made has a tendency to close up.

Other advantages of the Laflex cutting block are the absence of dust; the elimination, again because of the rubber content, of a great deal of vibration, thus making it easier on the operator of the machine and on the machinery itself; and also the fact that it is unnecessary to plane the surface of the block, even under hard usage, more than once in fifty days, while with the ordinary wooden block it is necessary to perform this operation at least once a week. Since each replaning operation removes one-quarter inch of material from the block, it is evident that a material saving as well as a time saving element enters the picture.

LOOKING FOR A JOB? . . . There are a number of good positions open in rubber factories. Consult Classified Section, this issue, page 39.

Fertilizing RUBBER TREES

Ammonium Phosphate Is Found To Be of Special Value—Use Should Begin in Nursery Where It Is Helpful in Starting Seedlings—Fertilizers Applied During "Wintering" Period

By FIRMAN E. BEAR
Director of Agricultural Research, American Cyanamid Co.

NO MATTER what the crop, whether it be corn or cotton, beans or barley, rice or rubber trees or any other of the numerous species of plants used for purposes of food, clothing, shelter, business, or pleasure, there is a method of fertilization by which the yield may be increased and the quality improved.

In more primitive times, the farmer depended upon nature to renew the soil from which his harvests had been removed. The rate of renewal was not a serious matter since, whenever the old land became unproductive, new land was always available.

As population grew and wants increased, the problem became somewhat more complicated. Wars, famines and pestilences were the result. It was only after centuries of struggle that science was able to intervene and show the way to a more logical solution.

As time went by, science not only demonstrated its capacity to take the most barren ground and transform it into a garden but showed that it is possible to increase the productivity of much of the virgin land as it is cleared from the forest.

The problem normally facing the producer of rubber is not that of improving poor land but one of keeping good land good and of making it even better. Rubber plantations are frequently clearings from tropical forests the heavy growth of which testifies to the inherent fertility of the soil.

While under natural conditions the forest vegetation falls to the ground and gradually becomes a part of the soil, as soon as clearing is effected and cultivation is begun, a new set of conditions arise which, in a tropical climate, are quite likely to have a ruinous effect. Rapid oxidation of the organic matter and excessive leaching and erosion by the torrential rains soon bring to the surface the soil's worst characteristics, whatever they may be. If the soil is naturally sticky and plastic it becomes even worse. If it is sandy and relatively low in nutrient elements, it is soon almost completely exhausted of them. If it is rolling in topography, it is likely to be seriously eroded.

Two practices are fundamental to success in the management of the soils of rubber plantations. One is that of devising some scheme for maintaining the supply of organic matter at a relatively high level. The other is that of providing an abundant supply of nitrogen to replace that lost by leaching and utilized in the growth of the trees.

Green Manuring Crops

To attempt to supply organic matter in the form of fertilizer is fundamentally unsound since the quantity which would be added with any reasonable application of an organic fertilizer would be insignificant. The answer lies in growing green-manuring crops and incorporating these with the soil. A variety of plants are available for this purpose. The choice depends upon the region. Normally a leguminous cover-crop is to be preferred by reason

Right: Young Rubber Trees in Excellent Growing Condition on the Kali Djember Estate, Java.
Below: Unfertilized Rubber Trees on Burma Rubber Company Estate.

of its capacity to accumulate a part of the needed nitrogen from the air.

In proportion as the trees grow to considerable size, difficulty is experienced, by reason of their shade, in growing satisfactory cover crops. But as this occurs, the leaves of the trees become a more important part of the total supply of organic matter and, if the trees are well supplied with fertilizer, may meet a large part of the requirements.

It is the general understanding that the only necessary fertilizer to be applied to any tree, no matter whether it be for rubber, fruit, or nuts, except as the soil is very sandy in nature, is one carrying nitrogen. Sulfate of ammonia is probably the most widely used fertilizer for *Hevea* rubber trees. It supplies nitrogen in an easily available form and yet one which cannot be readily leached from the soil. Ordinarily, its acid effect does not appear to be a cause for alarm in rubber production. When it is, cyanamid, carrying 75 per cent hydrated lime-equivalent as well as 21 per cent of nitrogen, can be substituted for the ammonium sulfate to advantage.

Ammonium Phosphate Comparatively New

When ammonium phosphate came on the market, the question arose as to whether the phosphoric acid of this material would have any supplemental value. It seemed likely that it would since many rubber soils were known to be quite deficient in this compound. Furthermore, phosphoric acid is especially useful in stimulating the growth of cover crops, particularly the legumes.

Contrary to what would have been expected, from tests which had been made with superphosphate as a supplement to sulfate of ammonia, it was found that this completely water-soluble phosphate not only had a markedly improved effect on the cover-crop but seemed also to be of additional direct benefit to the trees themselves. This experience was duplicated subsequently when ammonium phosphate was given trials on oranges, apples, and grapes.

Later it was discovered that while the phosphoric acid of superphosphate is normally fixed by the soil at or near the point of contact and has little penetrating capacity, that of ammonium phosphate is quite mobile in the soil. Accordingly, the ammonium phosphates have come in for a good deal of consideration in the fertilization not only of rubber trees but for all trees that are grown under conditions of cultivation.

Ammonium phosphates are now being produced by a number of fertilizer manufacturers. One well-known domestic company* produces two such materials sold under the name of "Ammo-Phos." One of these contains 11 per cent of nitrogen (13 of ammonia) and 46 per cent of phosphoric acid and the other 16½ per cent of nitrogen (20 of ammonia) and 20 per cent of phosphoric acid.

For best effects, the use of ammonium phosphate should begin in the nursery where it has been found to be of considerable help in starting seedlings. Phosphoric acid has a markedly stimulating effect on the roots. When the young seedlings thus treated are transplanted, they grow off rapidly and come more quickly to tapping. In terms of Ammo-Phos (13-46), the rate of application for this purpose is about one pound per 100 square feet of nursery area. The application may be repeated several times during the growing season.

After the trees have been transplanted the regular use of Ammo-Phos (20-20) is advised. The rate of application should begin with about 100 pounds per acre (assuming 75 to 100 trees on that area), the first year, and should increase at a rate of from 25 to 50 pounds each year until the annual application reaches about 500 pounds per acre. The heavier the soil the more useful the water-soluble phosphoric acid of the ammonium phosphate in the development of better root systems, and the larger the quantities necessary to be applied for most satisfactory results. On the lighter types of soil, muriate of potash may also be added to advantage at rates about half those indicated for Ammo-Phos.

Fertilizer is usually applied after the trees have begun to lose their leaves in the "wintering" period and before the new foliage has appeared. It should be scattered about the trees, away from the trunks, under the spread of the branches, and should be cultivated into the soil. Applications are made, preferably, just after a period of light showers and previous to the wet season normally expected. If any yellowness develops, if the sun-cracks or wounds on the bark do not heal readily, or if the rate of growth is not sufficiently rapid, the answer lies in increasing the rate of application. New growth on the ends of the limbs should be readily apparent.

In old plantations, previously unfertilized, heavier than normal applications may be made to advantage during the first few years after which the quantities should be reduced. A combination treatment involving both the use of Ammo-Phos and the growth of a legume cover-crop will be found most effective in stimulating new growth and an increased flow of latex.

*American Cyanamid Company (Editor).

MICRONEX W-5

IT was recently stated in an article in the August, 1930, issue of *Industrial and Engineering Chemistry,* that a certain grade of carbon black may be safely employed in the highest grade insulating compounds to be used next to the wire. When used in the proper way and in the proper proportions, the dielectric properties of the vulcanized rubber may even be markedly improved, while at the same time the reinforcing action increases the toughness and general physical properties. The special grade of carbon black mentioned in this study is manufactured by Binney & Smith Co., 41 East 42nd street, New York, N. Y., and is now available to the wire trade under the name of Micronex W-5.

Micronex W-5 is in all respects, except one, identical with standard Micronex. It has all of the reinforcing properties in rubber compounds possessed by Micronex and one additional characteristic, namely, that its absorptive properties are specially controlled in order to make it suitable for use in electrical insulating compounds.

Certain precautions must be observed in the use of Micronex W-5 in order to obtain proper results. It must be absolutely bone dry.

It is claimed that Micronex W-5 makes possible improved dielectric strength, resistivity and power factor. The exact proportions must be worked out in each case, depending on the compound. It is recommended to use 10% Micronex W-5 based on the crude rubber, plus the crude rubber contained in any reclaim that may be present. By varying the proportion upward and downward the exact optimum for each electrical property will be obtained.

Larger proportions of Micronex W-5 may also be used without detracting from the electrical properties. Loadings of over 20% on the rubber content have proven satisfactory. The advantages of the higher loadings are, of course, that the physical reinforcement and toughness are markedly increased.

It is suitable for use in compounds both for the inside stock (next to the wire) and in the high carbon tread-type jacket stock.

Micronex W-5 was in commercial use for nearly two years before being officially announced and advertised.

Toxic Substances *in the* Rubber Industry

PART XV

By P. A. DAVIS, A.B., M.A., M.D.

Assistant Medical Director, Goodyear Tire & Rubber Company

Ethyl Acetate

ETHYL acetate ($Ch_3CooC_2H_5$) is a derivative of ethyl alcohol and acetic acid and is prepared by combining acetic acid and alcohol. It is also known as acetic ether. Ch_3CooH Plus HOH_5C_2 $CH_3CooC_2H_5$ Plus H_2O. The conditions under which this reaction takes place are defined in any good organic chemistry book.

Ethyl acetate is a clear colorless liquid with a pleasing ethereal odor very similar to ripe apples. It boils at 77° and has a melting point at —82°. It is a good organic solvent and drying agent, for if it is pure it should dry without any residue. It mixes with all proportions of alcohol, ether, volatile and fixed oils. It is inflammable and burns with a yellowish flame and produces an acetic odor.

Toxicologically it is a compound of two very weak organic radicals, the ethyl group which has anesthetic properties and the acetic group which is not very toxic in itself but which under oxidation processes produce changes in the body which are detrimental, especially acidosis. Ethyl acetate has been used for anesthetic purposes but its reaction is slower than that of ether because the acetate group is present.

Ethyl acetate is used to some extent in medicine as a stimulant, anti-spasmodic, in place of ether for solvent purposes, as a substitute for ether in anesthesia, but it is too slow and the after effects are worse, and it is sometimes used as a local anti-rheumatic. It is used in pharmacial preparations often times as a flavoring agent or a perfumer.

It is used in industry as a solvent, flavoring agent and perfumer. Its use in the rubber industry is limited almost entirely to a solvent liquid and as such the commercial preparation is used. There are some possible impurities present which one must consider as toxic as,

1. Sulphur derivatives
2. Sulphuric acid
3. Butylic derivatives
4. Amylic derivatives
5. Complex aceto-acetic compounds

Ethyl acetate is used in mixtures for coating fabrics and in the manufacture of imitation leather. It is used in conjunction with benzol, alcohol, castor oil as a solvent for nitro-cellulose. Ethyl acetate is used as one of the constituents in some spray painting operations. The pleasant odor of ethyl acetate often masks the odor of more toxic substances which may be present, such as benzol, amyl-acetate and carbon tetrachloride, and in all cases such as this one, must not be misled by the odor when any complaints are made by the workers. Benzol poisoning may develop under the mask of ethyl acetate. Some of the dopes used contain as high as 44% ethyl acetate in conjunction with butyl and methyl acetates, benzol, acetone, and denatured alcohol.

In all these cases it is necessary to differentiate between the ingredients. Often times it is impossible and then it is called "dope poisoning."

Symptoms of Absorption

After examining many individuals who have been working with ethyl acetate and having them answer questions, the following seems to be the most common symptoms.

1. Lungs hurt and pain in chest
2. Pain in back or pain in kidneys
3. Nausea
4. Irritation of nose and throat
5. Eyes itch and burn
6. Skin burns, especially hands
7. Drowsiness
8. If vapors are strong,
   a. Dizziness
   b. Headache
   c. Backache
   d. Heartburn
   e. Difficult breathing
   f. Cough

In emergency cases, dizziness develops, drowsiness comes on and the individual looks for a place to lie down and a deep sleep develops similar to ether anesthesia. If a heavy meal has been eaten they usually vomit. There is a definite odor of ethyl acetate on the breath. The heart is palpitating at first and then becomes slower. Breathing is first labored and then becomes shallow.

The pupils are first contracted and as a deep sleep develops they dilate. Ethyl acetate acts similar to ether but is much slower in its action and produces a greater acidosis as an end result. In some cases where an individual has inhaled ethyl acetate over a long period of time, a skin rash may develop. This, however, is not due to ethyl acetate but to a condition of acidosis that has developed. The recovery period is very rapid and in 24 hours the individual is feeling very good, especially if they are in the open and take plenty of alkaline water into the system. The blood and urine of 140 of these individuals have recently been examined and in no case were there any pathological conditions found in the urine, with the exception of an increased output of acid and Ca. acetates.

The blood was from individuals who had been exposed from one week to two years and the following slight variations were noted:

1. Slight increased leukocytosis
2. Slight increased erythrocytosis
3. Increased number of lymphocytes (small)
4. Slight decrease in hemoglobin and later an increase
5. Very little change in cell contour

In one case there was a marked central pallor of the red cells with poikilocytosis and anisocytosis. In one case where there was a high leukocyte count (13,800) and a low percentage of polymorphonuclears there was a trace of sugar in the urine and after working one year this amount was increased to a great extent. Removal from contact and advice as to medical care caused the sugar to disappear. The blood picture as well as the urinary picture is not diagnostic of ethyl acetate absorption.

Suppression of urine and hematogenic blood activities are possible by a sudden and deep anesthesia by ethyl acetate.

Preventive Measures

With all volatile substances proper ventilation is necessary, and in this case it should be insisted on to the very minutest detail, because the pleasant odor of ethyl acetate gives no warning of its toxic effects, and secondly it is usually used in connection with benzol, CCl_4 or some other more toxic substance that it masks by its pleasant odor.

Spray painting operations should be done under suction ventilation.

Fabric coating and drying should be done under hoods.

Individuals should not be permitted to wash their hands in ethyl acetate mixtures to remove paint or cellulose compounds.

In some cases respirators should be worn.

The working personnel should be examined frequently and any cases showing any symptoms should be removed at once. Do not overlook the possibility of benzol poisoning in ethyl acetate mixtures.

Keep food in a different room, for it absorbs these volatile substances.

Have one or more extra persons who give 15-minute relief periods twice a day and instruct the worker to get in the open and inhale fresh air.

Treatment

1. Removal from contact
2. Fresh air and rest
3. Elimination, Diuretics and cathartics
4. Do not give acetanalid or coal tar derivatives for headache
5. Drink plenty of milk and water
6. Inhalation of oxygen in severe cases
7. When sedatives are necessary use bromides
8. Give alkaline drinks and one which has calcium as one of the constituents
9. In cases where there is need of heart stimulants use caffein and strychnine. Where respiratory stimulants are necessary use camphor and Alpha-Lobelin by hypodermic and ammonia by inhalation
10. For nausea use bismuth and opiates
11. The after treatment consists of iron and stimulating tonics and an alkalinization of the system for a short period
12. Continued exposure to Ethyl Acetate may produce an amyloid condition, due to excessive fat solution and animal fats should be fed in large quantities in the diet

Conclusion

Ethyl acetate is not very toxic in small percentages and may be used over long periods of time without producing any detrimental effects, nevertheless it should not be used without some precautions as some slight irritative conditions may develop. When it is used in mixtures containing other volatile solvents which are usually more toxic, great precautions should be used. The fact that it is eliminated very rapidly and from the chemical structure of the compound one would conclude that serious toxic conditions would not develop. The ethyl radical is an anesthetic radical and in most simple compounds where C_2H_5 is the positive radical the anesthetic properties are more or less marked. The negative radical often times is very toxic but in this case the acetate radical is not toxic and only produces acidosis if extremely large quantities are absorbed and is no different than taking an excess of vinegar or any other acid radical where the human alkaline reserve is reduced in order to neutralize it.

Ethyl acetate can safely be used if there is proper ventilation and the individual keeps his hands and arms out of the solution while he is working. Vapors should be kept at a minimum and at a level lower than the head of the individual, for constant inhalation will produce dizziness and sleep.

Ethyl acetate has a pleasing odor and will mask the odor of benzol, carbon tetrachloride, benzine, methyl alcohol and various other solvents with which it is usually combined and which are toxic. When any symptoms develop, look for the source of trouble as coming from some of the other constituents before considering ethyl acetate.

WILL THERE BE A RUBBER SHORTAGE IN 1935?

SO predicts Lt.-Colonel J. C. G. Kunhardt in his much discussed booklet on "The Future of Rubber", which has been extensively reviewed recently both here and abroad. It is now available in this country exclusively through THE RUBBER AGE. The booklet, published by the Rubber Shareholders Section of the Institution of the Rubber Industry, London, is the most comprehensive survey of the present conditions surrounding the rubber growing industry. The starting conclusions reached by the author and his predictions as to the possible situation in the next few years will make interesting reading to all those associated with the industry. The booklet will be sent postpaid upon receipt of 65 cents (stamps or currency) by THE RUBBER AGE, 250 West 57th Street, New York City, N. Y.

French Market for Rubber Sundrie

RUBBER goods of United States manufacture on t French market are meeting increased competiti from German articles, according to the reports o the Department of Commerce. In the first six months o 1930, according to the French official statistics, a total o 684 metric tons of rubber manufactures, valued at approxi mately $900,000, came from Germany as compared to 11 metric tons, valued at about $180,000 in the same perio of 1928. However, the value of the exports of rubbe sundries from the United States to France has increase from a value of $140,673 for the whole year 1928 t $140,778 for the first six months of 1930.

German shipments to France have therefore quad rupled in value in two years, while those from the Unite States have increased by 25 per cent. Reasons for the growth in the German trade are found in the improved manufacture, with special regard for French taste in color and outward appearance of the articles, in aggressive sale methods, long credits to distributors, and in competiti prices. These prices are made possible, in comparison quotations for similar American articles, by lower freight charges, by quicker deliveries, and by a tariff advantag German rubber goods receive the minimum rate under t French tariff, while those from the United States a taxed in the general schedule or at special rates. Althou the difference is not wide, being 12 per cent for instan on hot-water bottles, it affects sales where cost must b closely figured.

The French market for rubber sundries, from the American standpoint, presents the following features: High-quality goods command interest, while ordinary goods are abundantly supplied, at very low prices, by the domestic factories.

Business Fair Despite Depression

Although business is below the activity rate of a year ago, it is holding up well, in view of the world trade depression. The unfavorable trade balance is still causing concern, although July showed an improvement over June, 1930.

Owing to the sharp decline in the price of crude rubber since the beginning of 1930, wholesale prices of rubber sundries are now 25 per cent below those prevailing six months ago. Stocks in warehouses are declared to be large and further price concessions are anticipated before an upturn seems probable.

The following table shows the official United States exports of rubber sundries to France for recent periods. It will be noted that the trade for the first six months of 1930 is 79 per cent of the entire year of 1929.

United States exports of druggists' rubber sundries, specialties, and allied products to France

Item	1929 *Quantity*	1929 *Value*	*First six months,* 1930 *Quantity*	1930 *Value*
Water bottles and fountain syringes number	16,401	$9,434	3,739	$1,918
Rubber gloves, dozen pairs	537	2,565	615	2,485
Other druggists' rubber sundries	.....	12,722	.....	11,418
Rubber balloons, gross	290	380	103	468
Rubber toys and caps	.....	320	.....	1,341
Bathing caps, dozens	17,372	34,967	10,104	23,745
Rubber bands, pounds	9,913	4,815	14,550	6,936
Rubber erasers, pounds	7,803	5,342	5,764	4,166
Rubberized piece goods and hospital sheeting, square yards	2,680	3,581	4,038	1,642
Electrical hard rubber goods, pounds	38,956	14,216	21,541	13,788
Other hard rubber goods	.....	14,784	.....	30,597
Rubber specialties, n. e. s.	.....	75,303	.....	42,274
Total	.....	$178,429	.....	$140,778

The Influence of Zinc Oxide on the Action of the Principal Accelerators of Vulcanization*

The Preparation of Transparent Vulcanized Rubber

By R. THIOLLET AND G. MARTIN

IT HAS been known for a long time that the action of accelerators of vulcanization proceeds to a conclusion and in a regular way only in the presence of certain metallic oxides, of which zinc oxide is the most widely used. This substance behaves also as a reinforcing pigment, improving the physical properties of vulcanized rubber. We are not at the present time concerned with this second property, we are only concerned with ascertaining under what conditions zinc oxide promotes the action of accelerators.

Zinc oxide makes rubber opaque. With certain articles like molded nipples and vulcanized crepe soles, this opacity offers a serious inconvenience and we have studied how it is possible to obtain transparent vulcanizates.

To study these questions, we have carried out some vulcanization tests with the principal accelerators on the following three mixtures:

	I	II	III
Pale Crepe	100	100	100
Zinc Oxide	5	1	0
Palm Oil	1	1	1
Stearic Acid	0.5	0.5	0.5
Accelerator	..	..	..
Sulfur	..	..	..

*Translated from *Le Caoutchouc et le Gutta-percha*, Vol. 27, No. 317, pages 15084-7, July 15, 1930.

NAME OF ACCELERATOR	% of Sulfur on Rubber	% of Accelerator on rubber	Steam pressures corresponding to the characteristic temperature	T in min.
Zn isopropylxanthate	2	2	0	2
Zn methylphenyldithiocarbamate	1.8	0.7	1 kg.	24
Tetramethylthiuramdisulfide	1.8	0.4	2	6
Tetramethylthiurammonosulfide	1.8	0.4	2	8
Mercaptobenzothiazole	2.5	0.7	3	36
Diphenylguanidine	3	0.7	3	64
Di-o-tolylguanidine	3	0.6	3	56
Phenyltolylxylylguanidine	3	0.6	3	64
Triphenylguanidine	3.5	1	3	68
Ethylidene-aniline	3.5	1	2.5	40
Thiocarbanilide	5	2.5	3	88
Anhydroformaldehyde-aniline	4	2	3	72
Anhydroformaldehyde-p-toluidine	3.5	2	3	68
p-Nitrosodimethylaniline	3.5	1	2.5	60
Mercaptobenzothiazole + Diphenylguanidine	2.5	0.3 + 0.4	1.5	32
Mercaptobenzothiazole + Ethylidene-aniline	2.5	0.3 + 0.45	2	20
Zn methylphenyldithiocarbamate + Anhydroformaldehyde-aniline	1.8	0.7 + 1	1	24
Mercaptobenzothiazole + Anhydroformaldehyde-aniline	2.5	0.7 + 1	3	36

TABLE NO. 1

Choice of Conditions of Vulcanization.—The proportions of sulfur and of accelerator used correspond to those which are ordinarily used in practice.

Vulcanization was carried out at a characteristic temperature for a time, T, a little less than the time t corresponding at this temperature to the maximum vulcanization.

$$T \text{ is defined by } T = t - \frac{t}{5}$$

The characteristic temperatures and the corresponding times of maximum vulcanization were determined by the study we published in the October, 1929, number of *Le Caoutchouc et la Gutta-Percha*.

The accompanying table No. 1 summarizes the conditions under which the experiments were carried out.

On each of the mixtures thus prepared, tensile strength tests and accelerated aging tests were made.

Tensile Strength Tests.—Ring test pieces of definite dimensions were cut from each of the mixtures vulcanized under pressure. The mechanical properties were evaluated by the average of three dynamometer tests.

Aging Tests.—Samples such as we have just described were put in a ventilated oven, heated by an electric resistance, with a constant temperature control at 70°C. Every other day three samples of each mixture were withdrawn. Tensile strength tests were made after 24 hours' rest. The results represent the average of three tests. The total time of the aging test was ten days.

Results.—We have drawn the following conclusions from these tests:

1. Mixtures containing 5% of zinc oxide vulcanize in a normal way, but are opaque after vulcanization.

2. Mixtures vulcanized with 1% zinc oxide are in general transparent. Those vulcanized in the presence of accelerators composed of zinc salts of organic acids (Zn methylphenyldithiocarbamate; Zn isopropylxanthate) are not very transparent. In other mixtures containing accelerators which require relatively high proportions (guanidines) of sulfur, the transparency is masked by the sulfur "bloom." The physical properties of these mixtures are only slightly poorer than those of mixtures vulcanized in the presence of 5% zinc oxide. They age in the same way.

3. Certain accelerators can be vulcanized without zinc oxide.

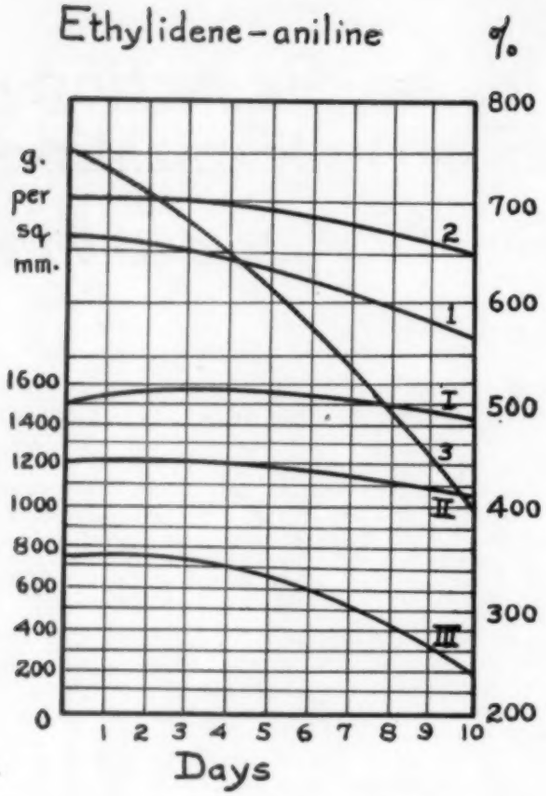
The mixtures obtained in this way are transparent, the transparency being masked sometimes by a sulfur "bloom." However, the physical properties of mixtures so obtained are very much inferior to those of mixtures vulcanized in the presence of zinc oxide. Besides, the vulcanizates obtained age badly and become "tacky" after a few days in the oven.

At the same time a considerable diminution of their physical properties takes place.

It is somewhat curious to learn that certain accelerators, like Zn methylphenyldithiocarbamate and mercaptobenzothiazole, which do not act without zinc oxide, become active if 1% of anhydroformaldehyde-aniline is added to the mixture. But the vulcanizates thus obtained also age badly.

Ethylidene-aniline and *p*-nitrosodimethylaniline are the two substances which impart the best aging properties to mixtures. These properties are, however, very unsatisfactory from a practical point of view.

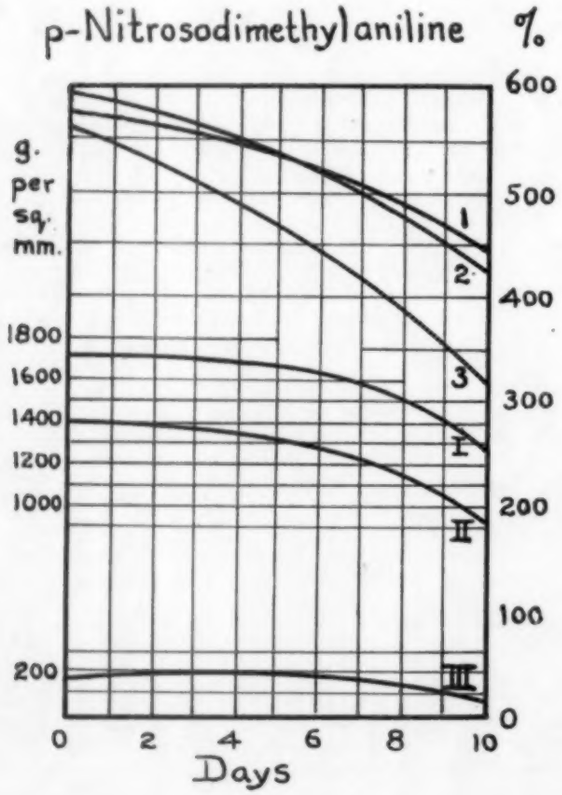
The accompanying graphs show the behavior on accelerated



aging of mixtures vulcanized with and without zinc oxide and containing one or the other of these two accelerators.

In addition, these products give mixtures which are transparent but strongly colored. This makes ethylidene-aniline and *p*-nitrosodimethylaniline of little interest in the manufacture of transparent goods.

In the case of these two accelerators, the difference between the



PROPORTIONS OF ZINC OXIDE	5%			1%			0%		
Accelerator Used	Vulcanization	Bloom	Transparency	Vulcanization	Bloom	Transparency	Vulcanization	Bloom	Transparency
Zn isopropylxanthate	#	-	-	#	-	-	-	-	-
Zn methylphenyldithiocarbamate	#	-	-	#	-	-	-	-	-
Tetramethylthiuramdisulfide	#	-	-	#	-	#	-	-	-
Tetramethylthiurammonosulfide	#	-	-	#	#	#	-	-	-
Mercaptobenzothiazole	#	#	-	#	#	#	-	-	-
Diphenylguanidine	#	#	-	#	-	-	#	#	-
Di-o-tolylguanidine	#	#	-	#	-	-	#	#	-
Phenyltolylxylylguanidine	#	-	-	#	#	-	#	#	-
Triphenylguanidine	#	#	-	#	#	-	#	#	-
Ethylidene-aniline	#	-	-	#	-	#	#	-	#
Thiocarbanilide	#	#	-	#	#	#	-	-	-
Anhydroformaldehyde-aniline	#	#	-	#	#	#	-	-	-
Anhydroformaldehyde-p-toluidine	#	#	-	#	#	#	-	-	-
p-Nitrosodimethylaniline	#	-	-	#	-	#	-	-	-
Mercaptobenzothiazole + Diphenylguanidine	#	-	-	#	-	#	-	-	-
Mercaptobenzothiazole + Ethylidene-aniline	#	-	-	#	-	#	-	-	-
Zn methylphenyldithiocarbamate + Anhydroformaldehyde-aniline	#	-	-	#	-	#	-	-	#
Mercaptobenzothiazole + Anhydroformaldehyde-aniline	#	-	-	#	-	#	-	-	#

EXPLANATION OF SIGNS :

Vulcanization : # vulcanized; - did not vulcanize

"Bloom" : # sulfur "bloom"; - no sulfur "bloom"

Transparency : # mixture transparent; - mixture opaque

TABLE NO. 2

physical properties of mixtures containing 5% and 1% of zinc oxide is considerable. It is usually less for other accelerators.

Table No. 2 shows the behavior of the different accelerators in the presence of 5% and 1% of zinc oxide, and also in its absence.

Conclusions.—The results of the data in the accompanying table show that it is necessary to use zinc oxide with all the accelerators of vulcanization. The proportion of this adjuvant, generally fixed at 5%, can be reduced to 1% in the case of certain accelerators, and this will give transparent mixtures. It is naturally well to select accelerators which do not color the rubber noticeably and which allow vulcanization with such a small proportion of sulfur that "blooming" does not occur.

The formulas indicated below are well adapted to the preparation of transparent mixtures.

Pale crepe	100	100	100	100
Zinc oxide	1	1	1	1
Palm oil	1	1	1	1
Stearic acid	0.5	0.5	0.5	0.5
Sulfur	1.8	1.8	2.5	2.5
Tetramethylthiuramdisulfide	0.4	..	..	..
Tetramethylthiurammonosulfide	..	0.4	..	..
Mercaptobenzothiazole	..	..	0.7	0.3
Diphenylguanidine	..	..	..	0.4
Vulcanization, time in min.	8	8	35	30
Steam Pressure in kg.	2	2	3	1.5

Extra copies of the Index to Volume 27 of THE RUBBER AGE may be secured upon request. It is printed as Section II of this issue.

Schaphorst's CHATS *with the* ENGINEER

By W. F. SCHAPHORST, M.E.

Improve Rubber Factories NOW

THERE are two outstanding reasons why repairing and modernizing should be done at this time:

1—The "business depression" is still with us but recovery is certain—just as certain as the coming of winter.

2—We are still enjoying summer weather when plant load is usually least. Most of us do not like to work hard in the summer time but nevertheless now is the time to do the overhauling.

Simply because boilers continue to function is no reason why they should not be overhauled. Uneconomical operation is a liability. Improvements in most lines of mechanical equipment are continually being made and it is up to us to keep our equipment abreast of the times. Obsolete equipment should be removed entirely and repaced by new equipment.

I have in mind equipment which pays for itself out of savings within six months. Some classes of equipment do even better. Some classes require two years, three years and more. It is well to establish a policy of our own and decide that if new equipment will actually pay for itself out of the savings within a fixed time the equipment now being used is obsolete and should be junked and replaced.

Furnaces, for example, can often be made more economical by adding a well of insulation. Probably the boiler baffle walls leak and need replacing. You cannot see your baffle walls while they are in operation. In fact it is almost impossible to see them while they are not in operation and for that reason they are so important. Many a boiler is permitting valuable hot gases to short circuit through directly from the furnace into the stack. Your method of boiler feed regulation can probably be very much improved. I recently saw a regulator installed in a comparatively small industrial plant which is now saving 2½ tons of coal every day. It pays for itself every week.

How about the vibration of your machinery? Elimination of vibration is now recognized as being highly important. Don't hesitate to install high grade natural cork foundations where necessary. Have the work done by experienced vibration engineeers.

No matter how careful you have been in the operation of machinery the time always comes when it should be replaced. Obsolescence is enevitable. But it doesn't pay to recondition everything. Many of the "pets" in your plant, regardless of sentiment, should very likely be taken out and replaced. Even if much of your equipment is in apparently perfect condition, still it may be obsolete. Thus a perfect wheelbarrow in a strong man's hands cannot compete with a modern motor truck when it comes to a mile haul. All of these things are worth investigating, thorough. Don't simply scan the surface and let it go at that. Do some figuring.

Circulation may be defective. Leaks should be stopped. Valves and stuffing boxes should be packed. Traps should be put in order. Control valves should be overhaued. Condensers, pumps, receivers, stokers, roofs, water spouts, skylights—all such things should be looked over carefully and put in A-1 condition. By doing these important jobs now greater efficiency and economy will result during the winter months and it is easier to do them now than later on when the equipment is needed. The man who anticipates, who uses his head, who always keeps several jumps ahead of the crowd is never in danger of losing his position. It is an enviable position to be in, and, after all it is not so difficult to get there and stay there if one is truly ambitious and industrious.

Statistics tell us that workers are in greater danger in winter than in summer. Boiler explosions are more frequent in December, January and February than in any other months. By adding together all the explosions during the other nine months of the year they just about equal the winter explosions.

Belgian Tire Exports

ACCORDING to preliminary official statistics of the U. S. Department of Commerce, Belgium exported 2,717,900 kilos weight of pneumatic tires during the first six months of 1930. During the first six months of 1930, it is estimated that Belgium exported 271,790 automobile casings as compared to 341,933 in the same period of 1929.

The following table shows the weight of Belgian tire exports as officially reported by countries in as much detail as available, as well as estimated number of casings exported to each market.

Belgian Tire Exports During Six Months Ended June, 1930

	First Sixth Months	
	Pneumatic Tires Kilos	*Automobile Casings Estimated*
France	841,300	84,130
Germany	489,900	48,990
Netherlands	195,900	19,590
Other Countries	1,190,800	119,080
TOTAL	2,717,900	271,790

The High Cost of Directorships

BRITISH rubber estate shareholders are showing keen interest in the excessive number of directors and their lack of enterprise. From the 900 rubber plantation directors in London no important suggestions as to meeting the rubber crisis have been forthcoming since plans for fresh restriction broke down. No other industry carries so much expense in the way of directors' fees and administration charges, in proportion to its capital, as rubber.

Of the 900 directors at least one-half have seats on more than one board. A good many have seats on ten or more directorates. Many companies of trifling capital have boards of three or four members. The absurdity of this is best seen in the fact that there are 300 directors to a large number of companies whose combined issued share capital is not much above £4,000,000. In some of the small companies the cost of directors alone is one-twelfth of the value of the rubber produced, taking this at 8 cents per lb. Obviously, one of the most urgent reforms for the industry is to reduce direction costs.

EDITORIAL COMMENT

Looking Up From Rock Bottom

OUT of the gloom which persists to obscure the horizon of business comes one faint ray of hopeful light. Statisticians of the National Industrial Conference Board have prepared a series of charts of business factors by which the period of general depression of ten years ago is compared with the present situation, with the result that a considerable degree of encouragement can be deduced.

The period of 1919-1921 is compared with that of 1928-1930. The fact is demonstrated that the business pendulum does not swing through a perfect arc. The greater part of the decline from the preceding maximum, during each of these two periods, occurred within a few months. Dullness then ensued and when the upward began it was in no sense a counterpart of the decline but a slow and gradual climb. This fact suggests that in the months since July, 1929, we have passed through the greater part of the decline and have reached the bottom level to be expected in the present depression.

One thing stands out very clearly in the report of the Conference Board and that is that in none of the factors described was the change so great in 1930 as in the earlier period. As the present depression is less severe, there is good ground for hope that it will not be so prolonged as that of ten years ago.

While it cannot be denied, according to the Conference Board that there is an undercurrent of feeling in the business world that the situation is worse than the newspapers seem willing to admit, if one turns to the picture which trustworthy recorded statistics unfold, one finds that it is neither so hopeful as that of the wholesale dealer in optimism nor so despairing as that of the retailers of pessimism.

One of the most interesting reports as affecting the rubber manufacturing industry, comes from the National Association of Manufacturers, which reports that in answer to questionnaires circulated through its membership, 11 per cent of rubber manufacturers reported the present state of their business as excellent, 22 per cent reported it as good, 11 per cent fair, with the remainder reporting poor. Eleven per cent also viewed the prospects for winter as excellent, while the same percentage reported them good, and 78 per cent regarded them as fair. Better business than last fall was reported by 22 per cent, lower by 67 per cent, with the rest noting no change. Low stocks on hand were reported by 33 per cent, normal by 67 per cent. Compared with last fall, employment has decreased, according to 67 per cent, with the rest reporting it unchanged. A decrease in wages was reported by 11 per cent, but 89 per cent reported no change. Greater production than last fall was reported by 22 per cent, a decrease by 56 per cent, with 22 per cent reporting no change. An increase in sales quantities was reported by 22 per cent, a decrease by 66 per cent, and no change by the rest, while 89 per cent reported a decrease in sales prices and 11 per cent reported no change.

The most optimistic news is to the affect that the westbound movement of crude rubber from New York through the port of Buffalo at the present time is the heaviest in the history of the port. The bulk of these shipments, received through New York from the Far East, are reported to be destined for three of the largest tire manufacturing concerns in Akron. This large movement of rubber at this time would indicate that a material improvement in factories operations can be shortly expected.

Receivership Suits

WE are pleased to note that the recent suit against the Kelly-Springfield Tire Company, on the part of one of the minority stockholders in an attempt to throw the company into receivership, has been dismissed. In view of the fact that the company's financial position, as last reported, was so favorable, it is difficult to see what possible justification could have existed for the institution of such a suit and the court is to be commended on the prompt dismissal of such action.

It seems a pity that the bankruptcy laws of the various states will so easily permit receivership actions of this nature, instigated oftimes by some small stockholders of one or a dozen shares, which drag the companies involved into court on the slightest pretext, to defend their good names, sometimes at costly expense. The damage that can result in many cases, even with companies of unquestionable financial position, is often irrepairable, for they always raise a doubt in the minds of the public as to companies standing. While the interests of the minority stockholders should be fully protected by law, the interests of the companies should have protection in some proportion to their obligations to their majority stockholders.

The RUBBER AGE

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Representatives in all the rubber centers of the United States, Canada, England, France, Germany and the Middle East.

The Rubber Industry's CURRENT NEWS

Financial—Personals—New Rubber Products—
Building Operations—Manufacturing—Exports

ECLAT RUBBER COMPANY OPERATES AT CAPACITY

For the past eighteen months, the Eclat Rubber Company, Cuyahoga Falls, O., manufacturer of juvenile vehicle tires, radiator hose and extruded rubber products, has been operating at a capacity average, retaining its piecework rates and keeping the same number of employes. "Our business has not only been steady," says C. E. Reiss, secretary and general manager, "but has shown an increase within the last few months."

Control of the company recently passed to Cuyahoga Falls interests, making it a home-owned industry. The officers, in addition to Mr. Reiss, are A. E. Holmes, president; Dr. R. J. Shoemaker, vice-president; and J. E. Smith, treasurer and factory superintendent. These excutives, together with S. W. Sweet, make up the board of directors.

FIRESTONE SAFETY RACE CUTS ACCIDENT RECORDS

A safety contest among the plants of the Firestone Tire & Rubber Company at Akron, O., has been organized, and the plant showing the greatest improvement in its accident record for the last six months of 1930 as compared to the first six months of 1930 will win the contest. The first month of the contest showed that for the month of July, 1930, compared with July, 1929, reductions were as follows: lost-time accidents, 82.9 per cent; over 7-day accidents, 76.5 per cent; days lost, 74.3 per cent; frequency rate reduced, 73.2 per cent; severity rate reduced, 56.7 per cent.

As the company has a steel products plant, a reclaiming plant and a power plant, it did not feel that it would be fair for them to compete on a low frequency and severity rate basis. For that reason, according to C. L. Hungerford, director of safety and hygiene, the contest was conducted so as to make each plant compete against its own record.

Goodyear Jacksonville Branch

The Goodyear Tire & Rubber Company has just opened a new, modern wholesale branch in Jacksonville, Fla., at the corner of Myrtle avenue and Houston street. Herbert F. McClure, manager of the branch, ascribes the necessity for the new building to growth in Goodyear's business in belting, hose, packing and rubber flooring as well as in tires.

Returns From World Tour

Samuel Broers, vice-president and general manager of the Firestone Tire & Rubber Export Company, landing at New York on the S.S. Paris last month, after a business trip that took him around the world. He traveled more than 30,000 miles and flew over Java, Egypt and the Holy Land in an airplane. Mr. Broers stated on his return that he found business conditions generally quiet in other countries and found activities in the United States far more encouraging.

CONFERENCES CONDUCTED AT GOODYEAR FACTORY

The tenth inter-plant conference was held at the Akron factories of the Goodyear Tire & Rubber Company from September 15 to 19. Superintendents and other executives were in attendance from Goodyear plants in Los Angeles, New Toronto, Bowmanville, St. Hyacinthe, New Bedford, Rockmart, Cartersville, Cedartown, Killingly, Gadsden, England, Australia, and Argentina.

During the following week, there was a convention on September 23 and 24 of 300 salesmen and branch managers of the company from all parts of the country. Entertainment programs were provided for both groups of visitors in addition to the scheduled business sessions.

LOS ANGELES RUBBER MEN HEAR SPENCE ON GUAYULE

Members of the Los Angeles Group of the Rubber Division, American Chemical Society, opened their 1930-1931 season on October 3 by a joint meeting with the Southern California Section, American Chemical Society, at the Engineers' Club, 833 South Spring Street, Los Angeles, Cal. After dinner had been served, the address of the evening was delivered by Dr. David Spence, technical director of the American Rubber Producers, Inc., on the subject of "The Production of Rubber from the Guayule Plant." His talk was illustrated by motion pictures.

The Los Angeles Group of the Rubber Division is planning several interesting programs for the current season. Information regarding its activities may be obtained from W. Richard Hucks, secretary-treasurer of the group, at the Pacific Goodrich Rubber Company, Los Angeles, Cal.

CORDUROY TIRE COMPANY SETS RECORD IN SAFETY

The Corduroy Tire Company, Grand Rapids, Mich., has operated since September 13, 1929, with a total of 685,085 manhours without a lost-time accident. Of this total, the company has worked 446,073 manhours during the current year.

As a result of this record, the Corduroy Tire Company has won the safety plaque given by the Grand Rapids Safety Council twice in a row. "We are bound and determined," says R. A. Bullock, in charge of safety work at the plant, "to win it once more so that it will be ours permanently."

St. Louis Sulphur Expands

The St. Louis Sulphur & Chemcial Company, St. Louis, Mo., has expanded its plant facilities by the construction of a new warehouse containing approximately 3,000 square feet of floor space. The addition was made necessary by continued growth of business.

Ohio Rubber Awards Contract

The Ohio Rubber Company, Willoughby, O., has awarded the construction contract for its new factory addition to the George A. Rutherford Company, Cleveland, O. The new plant will be 120 by 400 feet in size and will cost about $200,000.

Robert P. Stevenson

Robert Pevey Stevenson, associated with the Henry L. Scott Company, Providence, R. I., for the past five years, died at his home in East Providence on September 21st, in his 46th year.

Mr. Stevenson was born in Lowell, Mass., and educated in the public schools there. After graduation he entered M. I. T. and was a member of the Class of '07.

Prior to his association with the Scott Company he was employed by the Lockwood Greene Company, American Steel & Wire Company, Charles T. Main, William V. Threlfall, Mt. Vernon-Woodbury Mills at Baltimore and Saco-Lowell Shops, engaged in engineering and sales work.

Mr. Stevenson is survived by his widow and three sons, Robert, John and William. His mother, Mrs. Findlay Stevenson, of Lowell, and three sisters also survive him.

He was a member of the Worthen Street Baptist Church of Lowell, Kilwinning Lodge A. F. & A. M., Mt. Horeb Royal Arch Chapter, Alumni Association of M. I. T., the Chemists Club of New York, the Akron and New York Groups of the Rubber Section of the American Chemical Society, the Rhode Island Yacht Club, and other social clubs.

The Harshaw Chemical Company, Cleveland, O., has announced the opening of a Pittsburgh branch office with Howard L. Haney in charge. The address of the new Pittsburgh office is the Terminal Office Building, Carson Street and Terminal Way, S.S. A Cincinnati office has also been opened at 123 East 6th Street in that city, with William A. Bauman in charge.

JORDAN SALES MANAGER OF KELLY-SPRINGFIELD

John J. Jordan has been appointed by the Kelly-Springfield Tire Company, 1775 Broadway, New York City, to act as general sales manager. In this capacity he will succeed the late Thomas S. Lindsey, who died suddenly September 16.

Mr. Jordan was for some years with the Diamond Rubber Company before that organization was absorbed by the B. F. Goodrich Company. For the past eight years he has been associated with the Kelly-Springfield Tire Company as assistant general sales manager.

J. J. JORDAN

The annual meeting of the Rubber Exchange of New York will be held October 14.

U. S. Wins Bus Contract

The tire department of the United States Rubber Company has been awarded the contract for supplying the tire equipment for the buses to be used in the Detroit-Windsor tunnel under the Detroit River. Thirty buses will be used when the tunnel officially opens. Recently the first passenger car was driven through the new tunnel, the first vehicle in history to cross an international border under water. It was equipped with "U. S." tires.

General Tire Salesmen Confer

General Tire & Rubber Company salesmen and representatives from all parts of the country, more than 300 in number, attended a conference at Akron during the first week in October. Daily talks by W. O'Neil, president of the company, and a dinner October 1 at the Portage Country Club, were features of the program.

Machinery Dividend Cut

Directors of the National Rubber Machinery Company have declared a quarterly dividend of 25 cents a share on the outstanding common stock. This compares with 50 cents quarterly heretofore. The dividend will be paid October 15 to stock of record as of September 29.

Foote Brothers Name Agent

The Foote Brothers Gear & Machine Company, Chicago, Ill., have recently appointed the J. L. Hart Machinery Company, South Florida and Eunice Avenues, Tampa, Fla., as its representative in the state of Florida, south of a line drawn east and west across the state from Centralia to Titusville.

Stocks Break 1929 Lows

Goodyear, Goodrich and Lee common stocks closed on October 4 at their lows for the year or longer, while most of the other listed rubber company securities broke their 1929 "crash" lows during the fortnight. The failure of J. A. Sisto & Company, brokers, brought National Rubber Machinery, which had sold as high as 27⅛ this year, down to a new low of 1⅝. Closing prices on October 4 compare as follows:

	Last Price		—1930—	
	Oct. 6	Sept. 18	High	Low
Aetna	—	—	8½	5
Ajax	⅞	1	2½	¾
Amer. Hard Rubber	—	—	81	50
Dayton "A"	—	—	3⅞	3¾
Falls	—	—	4¾	8
Faultless	35¼	—	37	33¾
Firestone	—	20¼	33¼	16¼
do. 6% pfd.	—	69	87⅞	65
Fisk	1½	2	5½	1½
do. 1st pfd.	—	5½	21	4¾
General	—	—	163	110
do. pfd.	—	—	91	83½
Goodrich	18⅜	22¼	58½	18⅜
do. pfd.	77	—	104½	77
Goodyear	44¾	53⅛	96⅞	44¾
do. 1st pfd.	—	93	102	88
India	—	11	25½	8½
Intercontinental	—	—	7½	2⅛
Kelly-Springfield	2¼	3¼	6¼	1⅞
do. 6% pfd.	—	—	39	29
Lee	4	—	11	4
Mohawk	—	8	16⅝	8
do. pfd.	—	—	55	15
Norwalk	—	—	4	⅞
Pirelli	39	—	50⅞	38¾
Raybestos-Manhattan	23⅝	29¼	58⅞	22¼
Seiberling	—	—	18½	5
do. pfd.	35½	—	78	34½
U. S. Rubber	15½	18⅜	35	14
do. pfd.	30¼	36½	63⅞	29½

Japanese Executives Inspect U. S. Rubber Plant

THE Detroit factory of the United States Rubber Company acted as host last month to this delegation of Japanese executives and engineers, members of the Japanese branch of the Taylor Society who are touring the United States for the purpose of studying American methods of industrial organization and manufacture. After being entertained at lunch, the group was taken through the entire plant and later was addressed by M. A. Clark, manager of industrial relations for the tire company. The delegation included representatives of Japan's leading industrial firms.

Names in the News

M. G. O'HARRA, in charge of the tire jobbing division of the United States Rubber Company, has retired after many years of service. Originally a salesman in Omaha, he advanced from one post to another, making noteworthy records at Chicago and later at Pittsburgh. He was engaged in the sale of other products of the company for a time, but returned to tires and in 1929 was made manager of branch tire sales.

P. W. LITCHFIELD, president of the Goodyear Tire & Rubber Company, dined at the White House on September 19 as the guest of PRESIDENT HOOVER. Mr. Litchfield, who was in Washington to attend a meeting of the directors of the United States Chamber of Commerce, discussed the tire business and the lighter-than-air industry with the president.

FRANK BERNSTEIN, president of the Puritan Rubber Company, Trenton, N. J., has returned from an extended vacation in the White Mountains with his family.

H. M. SWAIN, formerly district manager for Oklahoma and Arkansas of the Thermoid Company, Trenton, N. J., has been made supervisor of sales for North and South Dakota, Wisconsin, Minnesota, Illinois and Michigan, with headquarters at Chicago. C. A. LEAS has been appointed district manager of the Pittsburgh territory. FRANK W. DANNER is now manager for the district around Richmond, Va., and CHARLES S. WRIGHT for the West Virginia district.

LORD HUGH TRENCHARD, former British air minister and a director of the Goodyear Tire & Rubber Company, attended the Goodyear board meeting at Akron September 22. He left for England October 5 immediately upon news of the R-101 crash.

DR. PETER A. FIREMAN, president of the Lambertville Rubber Company, Lambertville, N. J., is now in Europe on an extended business and pleasure trip.

WILLIAM H. SAYEN, treasurer of the Mercer Rubber Company, Trenton, N. J., has returned from a lengthy motor trip through Canada and Maine with his family.

WILLIAM A. HOWELL, superintendent of the Whitehead Brothers Rubber Company, Trenton, N. J., has returned to his office after a vacation spent in Maine and Canada.

JAMES W. SHADE, director of research of the B. F. Goodrich Company, has been named a member of a group of 150 industrial research engineers, executives and bankers who will make a tour of several American industries under the auspices of the National Research Council. The tour was scheduled to start October 7 and to continue until October 15.

R. & H. CHEMICAL COMPANY TRANSFERS DR. ZIMMERLI

Dr. William F. Zimmerli, who has recently been operating with the commercial development division of the Roessler & Hasslacher Chemical Company at the New York office, has been appointed head of the commercial development department at Niagara Falls, N. Y., and will make his headquarters at that place. Dr. Zimmerli, who has done considerable work in rubber chemistry, joined the R & H organization in October, 1928, taking a place in their rubber division service department in Ohio and the middle west. He has been secretary of the Akron Group of the American Chemical Society for the past year.

DR. WILLIAM F. ZIMMERLI

Dr. Zimmerli, after receiving his degree of B.S. from the Brooklyn Polytechnic Institute in 1909 and a degree of Ph.D. from Heidelberg, Germany, in 1912, worked two years with the B. F. Goodrich Company as research chemist and a similar length of time as assistant professor of chemistry at Akron University. He served as chief chemist with Pfaudler & Company, Rochester, N. Y., and with the Howe Rubber Corporation, New Brunswick, N. J. In 1924, he returned to the Goodrich organization.

E. L. LUTHEY, vice-president of the Seiberling Rubber Company, was one of the chief speakers at the annual meeting of the Oklahoma Tire Dealers' Association, held at Oklahoma City last month.

R. M. SHIVELY has resigned as advertising manager of the Mohawk Rubber Company, Akron, O., after eight years of service with that company. He has been named special sales representative in the Akron and Ohio districts for the Keep-Klean Cover Company, St. Louis, Mo.; the Allen-Morrison Sign Company, Lynchburg, Va.; and the Tennessee Enamel Manufacturing Company, Nashville, Tenn. Prior to joining Mohawk in 1922, Mr. Shively had been connected with the advertising and export departments of the Goodyear Tire & Rubber Company.

DR. J. H. PAYNE, of the Niagara Falls plant of the Roessler & Hasslacher Chemical Company, has been assigned a year's leave of absence to complete studies in Germany.

PAUL E. COLLETTE, secretary-treasurer of the Oak Rubber Company, Ravenna, O., recently won the golf championship of the Twin Lakes Country Club. Last year he was runner-up in the club tournament.

SIR HUBERT WILKINS, noted Arctic explorer, was a visitor to the factory and hangars of the Goodyear-Zeppelin Corporation at Akron, O., on the afternoon of October 6, as the guest of DR. KARL ARNSTEIN, vice-president of the company. He took a ride in one of the Goodyear blimps, together with FRED M. HARPHAM, vice-president of the Goodyear Tire & Rubber Company, and KARL FICKES, Goodyear pilot.

ALVIN C. GOETZ, who has been in charge of the Boston office of the Eagle Picher Lead Company for several years, has been placed in charge of dry pigment sales for the company, with headquarters at New York City.

RAY BROWN, Firestone Tire & Rubber Company engineer, has co-operated in the development of a single radiating tower type of radio antenna for use by the Police Department of Akron, O.

P. H. HART, former treasurer of the Goodyear Tire & Rubber Company, has been named as president of the newly formed Kenton Oil & Gas Company.

CATALPO

for

Treads

Rubber News Around the World

GOODYEAR OF CANADA WILL ADD TO SURPLUS

In a statement accompanying current dividend checks, C. H. Carlisle, president and general manager of the Goodyear Tire & Rubber Company of Canada, says the annual statement for the fiscal year ended September 30, which will be issued shortly, will reveal that, after writing down inventories to current market value, lowest in history of the rubber industry, company will be in a position to add to surplus account. Speaking of operations, Mr. Carlisle says earnings will not be comparable to normal years due to condition in the industry.

"During the year the company enjoyed a larger percentage of average business and relatively has increased its position" the letter says. "However, the rapid decline in market price of both cotton and rubber and material decline in unit value and prices of finished goods have made it impossible for the company to show earnings comparable with normal years."

Rubber Institution Meetings

Members of the Midland Section of the Institution of the Rubber Industry will meet at the Grand Hotel, Birmingham, on October 14 to hear a paper by A. V. Dwyer on "Patents in the Rubber Industry." The Manchester Section is scheduled to meet on October 23 in that city, at which time B. D. Porritt, F.I.R.I., will speak on "Some Aspects of Standardization."

British Motor Shows

Leading rubber manufacturers will have exhibits at the annual motor show, which opens October 16 at Olympia Hall, London. The commercial vehicle show will open on November 7 and the cycle and motorcycle show on November 10 at the same auditorium.

Rubber Goods Exports Drop

Exports of rubber and manufactures from the United States during the twelve months ended June 30, 1930, totaled $68,164,000. This compares with total shipments worth $75,833,000 in the year ended June 30, 1929.

J. Mandelberg Dividend

The directors of J. Mandelberg & Company, one of the leading British waterproof garment manufacturers, have declared an interim dividend of 6d. per share on the company's ordinary capital stock, this being equal to 2½ per cent. In 1929 the interim dividend was one of 4 per cent.

Rubber Goods Imports Lower

Imports of rubber tires into the United States during the twelve months ended June 30, 1930, totaled approximately 8,000, valued at $134,000, comparing with imports in the previous year of about 3,000 tires, worth $36,000. The value of other rubber manufactures declined to $1,800,000 as against $2,119,000 in the year ended June 30, 1929.

$500,000 FIRE DESTROYS GOODYEAR WAREHOUSE

The three-story warehouse of the Goodyear Tyre & Rubber Company (Great Britain), Ltd., at Bell Barn Road, Birmingham, was completely destroyed by fire last month, together with a stock of several thousand tires. The building was entirely gutted, only the outer walls being left standing, and the total loss was estimated at close to $500,000.

The blaze was one of the most serious in the Birmingham section for a long time. Although more than a hundred firemen and a score of engines and other fire fighting apparatus were present, it was early recognized that the building could not be saved, and all efforts were devoted successfully toward keeping the flames from spreading to adjoining structures.

MOLDS ARE KEPT CLEAN BY GERMAN PREPARATION

Patented by the firm of Herold, A. G., Hamburg, Germany, "Taka" and "Tulex" are two preparations which, used in conjunction, eliminate the work of cleaning molds. According to statements of the manufacturers the use of these preparations is not alone much cheaper than methods formerly employed, but gives casings and other molded goods a rich, glossy surface when they come out of the mold.

The life of the molds is claimed to be increased indefinitely by the use of these preparations, while the use of mold cleaning materials and tools is entirely eliminated, effecting an appreciable saving.

Company Formed at Sydney

A new rubber company has been organized at Sydney, Australia, under the name of Hoskings Products, Inc., with a nominal capital of £50,000, to manufacture molded rubber goods and to acquire an invention for reclaiming soft rubber. The incorporators are O. C. Hosking, J. W. Meader, A. R. Chrystal, A. H. Chrystal, R. B. Gard, A. J. Willcock, and R. P. Love.

American Rubber Soles Advertised in Paris

AMERICAN rubber soles are advertised prominently with this billboard display near the entrance of the Gare St. Lazare, one of the busiest railroad stations of the French capital. The Uskide soles featured in the display are manufactured by the United States Rubber Company and its subsidiaries.

CATALPO
for
Mechanicals

Rubber Goods and Specialties

Nu-Way Auto Rubber Sponge

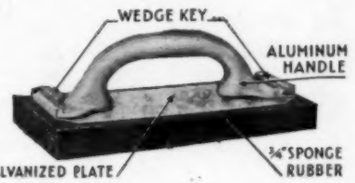
Two new rubber automobile sponges are now being marketed by the U. S. Rubber Specialty Company, Trenton, N. J., under the trade name Nu-Way. The "Individual" model, intended for the car owner, is slightly smaller than the "Service" model, designed for garage and car laundry use. Each is

equipped with a standard garden hose attachment. Tough, close grained sponge rubber is used, according to the manufacturer, and all dirt is carried away as it is rubbed loose. The sponge itself is automatically kept clean and always ready for instant use through the constant outflow of fresh water direct from the tap. The company is also making a "Utility" handled rubber sponge with a 12-inch enameled handle, but with no hose attachment.

EasyOn Rubber Roadgrips

Combining the quiet of rubber chains and the holding ability of metal chains, these EasyOn roadgrips are made of heavy rubber cross pieces studded with hardened steel rivets. They are intended for emergency use only when needed, and, according to the manufacturer, can be easily applied without jacking up the wheels, even in deep mud or

snow. A new web strap fastening permits the roadgrips to be fitted to either wood or wire wheels and adjusted satisfactorily. There is no metal near the paint. Three sizes of roadgrips fit all sizes of tires on either wood or wire wheels as well as the disc wheels on Ford trucks. They are made by the Woodworth Specialties Company, Binghamton, N. Y.



Morfloat Plastering Tool

Intended to replace the old style floats made of carpet or felt, this new plastering tool is being introduced by E. C. Atkins & Company, 402 South Illinois Street, Indianapolis, Ind., under the name of the Atkins Morfloat. The main feature of this tool is the sponge rubber base, three-quarters of an inch thick and scientifically worked out to give the right density and porosity to produce a perfect sand finish and maximum life. This base can be replaced at a nominal cost completely assembled with galvanized plate, taking but a minute to change. An aluminum handle gives minimum weight and maximum strength, and wedge keys fasten the handle securely to the galvanized plate. The Atkins Morfloat is made in one size only, 8¼ by 3¾ by ¾ inches, this size being recommended as the most practical from every standpoint.

Golf Course Surfacing

The Willard Rubber Company, Ltd., San Diego, Cal., has developed an appreciable business in surfacing material for miniature golf courses. Cottonseed hulls, mixed with liquid latex as a binding agent, is the material which is increasing in popularity among the miniature links on the Pacific Coast.

Balloon Baby Carriage Tires

Balloon tires for de luxe baby carriages is a new idea originated by the Bilt-Rite Baby Carriage Company, Brooklyn, N. Y. The tires are "U. S." Peerless, manufactured by the United States Rubber Company, 1790 Broadway, New York City. They have a height of 12.75 inches and a cross-sectional diameter of 2.50 inches. They are of single tube construction and take 15 pounds of air. In addition to giving the baby the gentlest ride possible, these tires enable the carriage to go up over curbs without difficulty. The carriage itself is

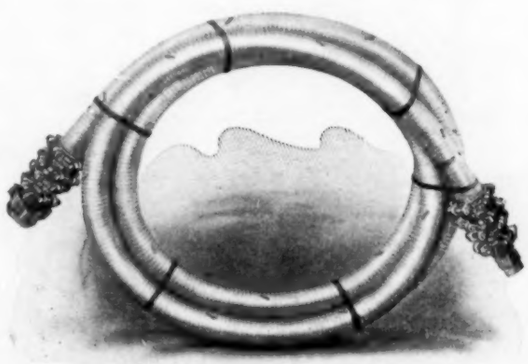
equipped as to its rubber parts exclusively by "U. S." products, among which are the lever hand grips and the rubber discs which take up all the shocks and the vibration not taken up by the springs.

Rubber-Cushioned Sample Case

A sectional luggage or sample case unit, furnished in an assortment of sizes to fit different requirements, has been developed by the Ideal Manufacturing Company, 977 State Street, Bridgeport, Conn. Each case forms a complete unit with steel strip locks right and left holding the assembled cases in place with rubber cushions between each to prevent vibration. Each case is held at the back with interlocking corners. A dust and water proof cover goes over the cases, fastening to a bottom piece. The unit will fit all standard trunk racks.

Goodall Rotary Hose

UNDER the name of New Super Goodall Semi-Metallic Rotary Hose, the Goodall Semi-Metallic Hose & Manufacturing Company, 165 West Columbia Avenue, Philadelphia, Pa., is offering a recently developed and patented rotary drilling hose. The inner tube is of the highest grade rubber to resist abrasion from sand, while the free flexing ball joint armor completely protects the hose from exterior wear, adapting it for heavy oil field work.



Current Crude Rubber Items

NEW DUTCH INDIES BILL TO END FORCED LABOR

A bill recently introduced in the People's Council at Batavia proposes the gradual abolition of indentured labor under penal sanction in the Netherlands East Indies. The bill provides that estates opened during or before 1921 must be able to show free laborers to the extent of 20 per cent of their working force on January 1, 1932, 30 per cent by 1934 and 50 per cent by 1936.

Estates opened from 1922 to 1927 will have to show the same percentages on the eleventh, thirteenth and fifteenth years of their existence, respectively, and plantations opened from 1928 to 1930 would have to have 50 per cent free labor on January 1, 1942.

The question of admitting rubber produced under such penal sanctions into this country was brought up in the recent sessions of Congress on the tariff act. An amendment introduced by Senator Blaine of Wisconsin now provides for the exclusion of products made by such indentured labor.

Dutch Reconsider Situation

A conference has just been held between members of the Dutch committee of the Rubber Growers' Association and the Netherlands Minister for the Colonies. A cable report of the conference says, "In the course of the discussion it was made clear that the government fully realizes the danger of the situation and was ready to reconsider the rubber problem in all its aspects, further, that the government is prepared to consider the possibility of taking measures to improve the situation. The Minister for the Colonies intends to co-operate with the governor general of the Dutch East Indies for this purpose."

Exchange Closes October 11

The board of governors of the Rubber Exchange of New York voted on October 2 to close the exchange on Saturday, October 11, but directed that members who have rubber to deliver keep their offices open on that day.

New Guayule Factory

American Rubber Products, Inc., a subsidiary of the Intercontinental Rubber Company, has awarded a contract for a one-story rubber product manufacturing plant at Salinas, Cal., to E. F. Reese of that city. The plant will be 100 by 102 feet in size and will cost approximately $150,000.

SCIENTISTS FIND RUBBER ONCE GREW IN GERMANY

According to the London *Times*, miners in the German lignite (soft coal) deposits, frequently come across patches of a fibrous substance that they name monkey's hair.

Botanists have analyzed the substance and made a close examination of the layers in which it occurs. In the latter they discovered large quantities of fossil leaves, which were nearly all of one well-marked type, and they ascertained that it was the ribs of such leaves that had been preserved, and which constituted the "monkey's hair."

Chemical analysis revealed the presence in these leaves of shreds of india-rubber, and this, with the fact that the leaves had the form of those of the india-rubber plants that are used today as a household decoration, convinced the scientists that india-rubber trees flourished in prehistoric times in the districts where the great central German lignite deposits now exist. It is highly probable that those trees were of the type that now grows so plentifully in the tropics of Asia.

RUBBER GROWERS' ASSN. ABANDONS RESTRICTION

The Rubber Growers' Association, Inc., has just circularized its members, stating: "It will be evident to all that until the decision of the Dutch East Indies as recently announced, no useful purpose can be served by this association giving further consideration to any proposals for compulsory regulation of rubber supplies."

The letter stated that full production, even at reduced costs, can not ameliorate the situation since it will be nullified by a further fall in the price of rubber. The association recommends that producers suspend tapping entirely if the excess expenditure over income isn't likely to be increased by so doing. Since at present prices production of every pound entails a loss, where it has been decided to maintain production, contraction of output may, in some cases, result in minimizing the loss, since reduced volume may be taken off the most productive areas at lower operating costs.

Bringing young rubber to tapping should be postponed, according to the circular, and old areas giving small yields should be put out of tapping. The association states: "If producers determine to rationalize production in the manner indicated equilibrium between supply and demand will be expedited, resulting in an increase in price to the advantage of all producers, while meantime valuable bark will be conserved and cash resources husbanded."

DEALERS IN OFF GRADES SUSPEND AT SINGAPORE

Owing to unprofitable prices, three firms engaged in the manufacture of amber and brown grades of crude rubber at Singapore have suspended operations, according to cable advices to members of the Rubber Exchange of New York. There are now only four Singapore firms producing these grades to remain in operation.

The ambers and browns are widely employed by tire manufacturers in this country as "softeners" with ribbed smoked sheets, the standard grade of crude rubber, in tire manufacture.

Current New York quotations for the ambers range between 6¼ and 7⅛ cents per pound, those for clean thin brown crepe, 7 cents, and rolled brown crepe, 6⅝ cents.

Ford to Spend $1,000,000

The current depression in the price of crude rubber is not interfering with the Boa Vista rubber plantation project of the Ford Motor Company in the Amazon Valley section of Brazil. The company has announced that $1,000,000 is being spent this year on the concession.

Closing Prices on Rubber Exchange of New York, Inc.

FROM SEPTEMBER 19 TO OCTOBER 3, 1930

		Spot	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Sales
No. 1 Standard Contract of 10 Tons															
Sept.	19	8.00	7.95	8.05	8.15	8.30	8.45	8.60	8.70	8.80	8.91	9.02	9.18	——	137
	20	7.90	7.87	7.97	8.07	8.21	8.34	8.47	8.61	8.75	8.87	8.98	9.10	——	3
	22	7.90	7.86	7.96	8.06	8.20	8.33	8.46	8.60	8.73	8.84	8.95	9.10	——	10
	23	7.81	7.76	7.85	7.95	8.09	8.22	8.36	8.49	8.62	8.73	8.84	9.00	——	20
	24	7.81	7.76	7.83	7.90	8.06	8.18	8.30	8.45	8.60	8.73	8.85	8.98	——	7
	25	7.62	7.66	7.77	7.83	8.01	8.14	8.27	8.38	8.52	8.65	8.78	8.92	——	30
	26	7.62	7.66	7.66	7.76	7.89	8.02	8.15	8.29	8.42	8.53	8.62	8.80	——	103
	27	7.62	7.60	7.60	7.80	7.92	8.03	8.15	8.30	8.45	8.55	8.65	8.80	——	6
	29	7.56	7.50	7.56	7.66	7.80	7.93	8.06	8.21	8.35	8.46	8.57	8.72	——	26
	30	7.43	7.36	7.45	7.55	7.68	7.80	7.92	8.03	8.14	8.24	8.34	8.50	——	45
Oct.	1	7.57	7.38	7.43	7.48	7.63	7.77	7.92	8.06	8.20	8.30	8.40	8.54	8.70	3
	2	7.62	7.40	7.55	7.73	7.86	7.98	8.10	8.25	8.40	8.50	8.62	8.76	8.90	52
	3	8.00	8.15	8.25	8.35	8.47	8.59	8.70	8.85	8.90	9.05	9.12	9.35	9.50	117
"A" Contract of 2½ Tons															
Sept.	19	——	7.80	7.90	8.00	8.20	8.30	8.40	8.50	8.60	8.80	8.90	9.00	——	400
	20	——	7.80	7.90	8.00	8.10	8.20	8.40	8.50	8.70	8.80	8.90	9.00	——	41
	22	——	7.80	7.90	8.00	8.10	8.20	8.30	8.40	8.60	8.70	8.90	9.00	——	64
	23	——	7.70	7.80	7.80	8.00	8.10	8.20	8.30	8.50	8.60	8.70	8.90	——	124
	24	——	7.70	7.80	7.80	8.00	8.10	8.20	8.30	8.50	8.60	8.70	8.90	——	113
	25	——	7.60	7.70	7.80	7.90	8.00	8.10	8.20	8.40	8.50	8.60	8.80	——	192
	26	——	7.60	7.50	7.70	7.80	7.90	8.00	8.20	8.40	8.50	8.50	8.70	——	278
	27	——	7.50	7.50	7.70	7.80	7.90	8.00	8.10	8.30	8.40	8.50	8.70	——	37
	29	——	7.40	7.40	7.60	7.70	7.80	7.90	8.10	8.20	8.30	8.40	8.60	——	141
	30	——	7.30	7.30	7.50	7.60	7.70	7.80	7.90	8.00	8.10	8.20	8.40	——	215
Oct.	1	——	7.30	7.30	7.40	7.50	7.60	7.80	7.90	8.10	8.20	8.30	8.40	8.60	108
	2	——	7.30	7.40	7.60	7.70	7.80	8.00	8.10	8.20	8.30	8.40	8.60	8.70	37
	3	——	8.10	8.20	8.30	8.40	8.50	8.70	8.80	8.80	9.00	9.10	9.30	9.40	462

GOODRICH LICENSES DORR IN THERMOPRENE PROCESS

Recognizing the commercial importance of rubber-covered industrial equipment where acidic or abrasive materials are handled, the Dorr Company, 247 Park avenue, New York City, after a comprehensive investigation of the art of rubber covering, has acquired from the B. F. Goodrich Company, Akron, O., licenses for the use of its Thermoprene process. A plant for the application of rubber to steel, iron, and other metal parts under the Thermoprene process patents has been added to the manufacturing establishment of the Dorr Co., and has already successfully applied more than 5,000 sq. ft. of rubber to thickeners, agitators, rod mills, ball mills, pumps, filters, and similar industrial equipment.

The normal rubber stock used in this process is a soft rubber having a high resistance to abrasion and acid solutions for temperatures up to the boiling point. In the chemical field and in certain metallurgical fields where acid solutions are handled, the rubber-covered Dorr machines are expected to be particularly attractive, since the parts may now be manufactured for maximum strength and minimum cross section, using steel protected by rubber, instead of the heavy and bulky construction when either lead-covered steel or wood is used. The low coefficient of friction of wetted rubber opens up attractive possibilities wherever wetted, granular materials are conveyed in troughs and launder.

GENERAL CABLE CORP. TO COMBINE ITS DIVISIONS

On October 1 the General Cable Corporation, Rome, N. Y., altered its previous policy and began operations as one organization. All sales, manufacturing and accounting activities formerly carried on independently and in the name of its individual divisions are now transacted only in the name of the corporation itself.

The companies which were merged to form the General Cable Corporation include the A-A Wire Company, American Insulated Wire & Cable Company, Atlantic Insulated Wire & Cable Company, Detroit Insulated Wire Company, Dudlo Manufacturing Company, Peerless Insulated Wire & Cable Company, Phillips Wire Company, Rome Electrical Company, Rome Wire Company, Safety Cable Company, Standard Underground Cable Company, and Southern States Cable Company.

R & H Names Chemists

New appointments to the technical staff of the Roessler & Hasslacher Chemical Company, Niagara Falls, N. Y., include: Noah S. Davis, Jr., Ph.D., Yale, 1930; Alton Gabriel, Ph.D., Cornell, 1930; H. E. Klein, Ch.E., Purdue, 1930; Lloyd Mann, B.S., Middlebury College, 1930; H. A. McPhail, M.S., Toronto University, 1930; W. T. Rinehart, M.A., Indiana University, 1930; W. B. Tanner, Ph.D., State University of Iowa, 1930; and Jane Williams, B.A., Indiana University, 1930.

A. C. S. 1931 Fall Meeting Will Be Held at Buffalo

After investigation had shown that facilities available at Chautauqua, N. Y., were inadequate for a meeting of the American Chemical Society, the Western New York and Erie Sections recently withdrew their invitation for the society to hold its meeting there in the fall of 1931, and substituted therefor an invitation to meet in Buffalo. This has been accepted, and the members of the society will convene at that city in the week of August 31 next year.

Rubber Division members will find much of interest in Buffalo, which has risen to a position among the leading rubber manufacturing centres of the country. In addition to the plants of the Dunlop Tire & Rubber Company, the Hewitt Gutta Percha & Rubber Company and the U. S. Rubber Reclaiming Company, there are several smaller mechanical goods factories in the city and suburbs.

Compiling Laboratory List

The Research Information Service of the National Research Council is preparing a revision of its "Industrial Research Laboratories of the United States, Including Consulting Research Laboratories," the third edition of which was published in 1927. Laboratories that have not already filled out questionnaires should communicate at once with this organization at B and 21st streets, Washington, D. C.

Pouvailsmith Auction Sale

The plant and equipment of the Pouvailsmith Corporation, manufacturer of steering wheels, Poughkeepsie, N. Y., will be sold at absolute auction at a trustee sale on the premises October 22 and 23, starting at 10:30 a. m. The land with modern brick buildings, sprinkler system, railroad siding, power plant and about 100,000 square feet of floor space will be offered, together with various chemical and rubber machines, machine tools, woodworking machinery, materials and supplies, and office equipment. Further details may be obtained from Louis Himoff, auctioneer, 225 Lafayette street, New York City, who will conduct the sale.

CATALPO
for
Frictions

GOODYEAR MONSTER TIRE ENDS 26,000-MILE TRIP

After traveling nearly 26,000 miles, more than the distance around the earth, the world's largest tire No. 1 recently arrived in Akron. The tire, one of a pair built by the Goodyear Tire & Rubber Company, traveled through 24 states and sections of Canada, Mexico and Cuba, experiencing temperatures from 20 degrees below zero to 110 in the shade over all types of roads.

The mammoth tire is 12 feet high and four feet wide, and with the wheel it weighs approximately one ton.

CLASSIFIED ADVERTISING

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THE RUBBER AGE
250 West 57th St., New York City

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WANTED—A chemical supply house catering to the rubber industry wants a man with technical training in that industry and possessing a knowledge of preparation and printing of manuscripts to edit a house organ, the contents of which will be essentially reports on various kinds of laboratory work. Address Box 571, THE RUBBER AGE.

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LATE MARKET PRICES

RUBBER—COTTONS AND FABRICS—CHEMICALS

NEW YORK, OCTOBER 4, 1930

RUBBER

Crude

AFTER dropping to a new low of 7½ cents a pound on October 1 and 2, the closing price quotation for spot smoked ribbed sheets on the New York outside market jumped sharply to 8¼ cents on October 3 and closed the following day only a quarter of a cent lower. On October 1, the "A" contracts on the New York Rubber Exchange set an all-time low of 7.20 cents a pound for the October delivery and London prices touched a new bottom at 3 9/16 pence.

The rally on October 3, caused partly by the improvement of sterling on the foreign exchange market, may or may not be the forerunner of an upward movement in the commodity, but it brought out unusually heavy quantities of buying not only on the exchange but in the market for actuals. Representatives of manufacturers hastened to purchase good quantities for their clients as soon as the price began to turn upward.

The only actual news has been bearish rather than otherwise, September shipments from Malaya totaling 49,229 tons, an increase of 1,427 tons over the August exports of 47,802 tons.

Prices quoted on the New York outside market on October 4 were as follows:

Plantations—

Ribbed Smoked Sheets—			
Spot-Oct.		.07⅞@	.08
Nov.-Dec.		.08 @	.08¼
Jan.-Mar.		.08¼@	.08½
First Latex, crepe spot		.07⅞@	.08¼
Amber Crepe, No. 2		.07⅝@	.07⅞
Amber Crepe, No. 3		.07⅛@	.07⅜
Amber Crepe, No. 4		.06⅞@	.07⅛
Brown Crepe, Clean thin		.07 @	.07¼
Brown Crepe, specky		.06⅝@	.07
Liquid Latex, per gal.		.75 @	.85

Paras—

Up-river Fine		.12 @	—
Up-river Medium		Nominal	
Up-river Coarse		.06½@	—
Acre Bolivian, fine		.12 @	—
Caucho Ball, Upper		**.08 @**	**—**
Islands, fine		Nominal	

Centrals—

Central, scrap		— @	.06
Esmeraldas		— @	.06

Balata—

Block, Colombia		Nominal	
Block, Ciudad		.41 @	.42

LONDON MARKET

Standard Ribbed Smoked Sheets—Buyers		
Spot-October	3⅞@	4d
Nov.-Dec.	4 @	4⅛d
Jan.-Mar.	4⅛@	4¼d

SINGAPORE MARKET

Standard Ribbed Smoked Sheets—Sellers		
Spot	3½d@	—

Scrap

The scrap rubber market is beginning to feel an increase in activity, although very slight, that would seem to promise better conditions in the late fall and early winter. Reclaimers, who have been cutting their stocks down to unusually low levels, are expected to raise their production schedules in the very near future. Late prices follow:

(Prices to Consumer)

Auto tire peelings	ton	23.50	@25.00
Mixed auto	ton	12.00	@12.50
Bicycle tires	ton	9.00	@10.00
Clean solid truck tires	ton	24.50	@26.00
Boots and shoes	cwt.	1.10	@ 1.25
Arctics, untrimmed	cwt.	.90	@ 1.00
Inner tubes, No. 1	lb.	.05¼@	.05½
Inner tubes, No. 2, compounded	lb.	.02⅛@	.02¼
Inner Tubes, Red	lb.	.02¼@	.02⅜
Air Brake Hose	ton	10.00	@12.00
Rubber Hose	ton	9.00	@10.00

Reclaimed

Manufacturers of reclaim are content to hold their stocks down to a low level, keeping production below the current demand. Sales of the better known types continue steady, although diminished by present conditions, and reclaimers will soon be forced to increase their output in order to insure an adequate supply. Late prices follow:

High Tensile

Super-Reclaim Black	lb.	.08½@	.08¾
High Tensile Red	lb.	.08¼@	.08½

Shoe

Unwashed	lb.	.06 @	.60¼
Washed	lb.	.08 @	.08¼

Tube

No. 1 (Floating)	lb.	.08½@	.08¾
No. 2 (Compounded)	lb.	.07½@	.07¾

Tires

Black	lb.	.05¾@	.06
Black, selected tires	lb.	.06 @	.06½
Dark Gray	lb.	.07 @	.07½
Light Gray	lb.	.07¾@	.08
White	lb.	.08¾@	.09
Truck, Heavy Gravity	lb.	.06 @	.06¼
Truck, Light Gravity	lb.	.06¼@	.06½

Miscellaneous

Mechanical blends	lb.	.05 @	.05½

COTTON and FABRICS

Cotton

DURING the month of September, the average daily closing price for spot middling upland cotton at New York was 10.85 cents a pound, the lowest figure in many years. This compares with an average closing price of 12.03 cents in August and 18.83 cents in September, 1929.

Several authorities in the trade consider the commodity in a better position now than it has been during some previous years when the price was far higher. Domestic sales of cotton goods have recently been running slightly ahead of production while the situation in foreign countries has been showing improvement. The trade, however, is waiting the government crop report figures before taking a decided position.

The high, low and closing prices on the New York Cotton Exchange on October 4 follow:

	High	Low	Close Oct. 4	Close Sept. 19
Oct.	10.35	10.21	10.21	10.82
Dec.	10.56	10.42	10.42	11.01
Jan.	10.66	10.50	10.50	11.10

Tire Fabrics

There has been some activity in certain grades of tire fabric during the fortnight, but business still remains well below normal. Price quotations fell off slightly in sympathy with the current low levels for raw cotton, the different grades closing as follows:

CORD

Peeler, carded, 23/5/3	lb.	.37½@	.38
Peeler, carded, 23/4/3	lb.	.39½@	.40
Peeler, carded, 13/3/3	lb.	.35 @	.35½
Peeler, carded, 15/3/3	lb.	.35½@	.36
Egyptian, carded, 23/5/3	lb.	.48¼@	.48¾
Egyptian, combed, 23/5/3	lb.	.54 @	.55¾

CHAFERS

Carded, American, 8 oz.	lb.	.33 @	.34
Carded, American, 10 oz.	lb.	.32½@	.33
Carded, American, 12 oz.	lb.	.31 @	.32
Carded, American, 14 oz.	lb.	.30 @	.31

LENO BREAKER

Carded, American, 8¼ oz.	lb.	.34 @	.37½
Carded, American, 10¼ oz.	lb.	.34 @	.37½

SQUARE WOVEN

Carded, American, 17¼ oz. 23-11 ply	lb.	.38 @	.38½
Carded, American, 17¼ oz. 10-ply	lb.	.30½@	.31½

Sheetings

The market for sheetings closed the fortnight unchanged, except for fractional changes in one or two sizes. The latest price quotations, as reported by the Textile Brokers Association, are as follows:

40-inch, 2.50-yard	yd.	— @	.08½
40-inch, 2.85-yard	yd.	— @	.07½
40-inch, 3.15-yard	yd.	— @	.08½
40-inch, 3.60-yard	yd.	.07⅛@	.07¼
40-inch, 3.75-yard	yd.	— @	.06¼
40-inch, 4.25-yard	yd.	— @	.05½

Ducks

The market for cotton ducks has been featureless during the past two weeks, prices remaining intact and buying continuing to be light. Current prices for the various grades remain as follows:

Belting and Hose	lb.	.29 @	.30
Enameling	lb.	.28 @	.31
Single filling	lb.	.13¼@	.13½
Double filling	lb.	.14 @	.15

CHEMICALS

ANOTHER half-cent reduction in the quotations for carbon black, made on September 29, brings the price of this important compounding material to its lowest levels and is a result of the heavy production coupled with the present slack demand because of the rubber industry's low rate of activity. Replies just made to a questionnaire of the National Association of Manufacturers, however, indicate that the rubber industry will pick up this fall. While 66 per cent of the rubber companies reporting find present business poor, 11 per cent find it fair, 22 per cent good and 11 per cent excellent. Winter prospects were regarded as excellent by 11 per cent, good by 11 per cent and fair by 78 per cent.

ACCELERATORS

Organic

A-1	lb.	.24 @	.27
A-5-10	lb.	.33 @	.36
A-7	lb.	.55 @	.59
A-11	lb.	.62 @	.66
A-16	lb.	.57 @	.61
A-19	lb.	.58 @	.62
A-20	lb.	.64 @	.68
A-32	lb.	.90 @	.95
Aldehyde ammonia, crystals	lb.	.65 @	.70
Aniline oil, drums, f.o.b. works	lb.	.15 @	.16
Captax	lb.		
Crylene	lb.	.55 @	.65
paste	lb.	.45 @	.55
Di-Ortho-Tolyguanidine	lb.	.42 @	.44½
Diphenylguanidine	lb.	.30 @	.32½
Dipsol	lb.	4.30 @	4.50
Ethylidene aniline	lb.	.45 @	.47½
Formaldehyde aniline	lb.	.37½@	.40
Heptene	lb.	.40 @	—
Hexamethylene-tetramine	lb.	.58½@	.61
Lithex	lb.	.18 @	.20
Methylenedianiline	lb.	.37½@	.40
Monex	lb.	3.25 @	—
Oxynone	lb.	.68 @	.80
Phenex	lb.	.75 @	—
R & H 40	lb.	.40 @	.42½
R & H 50	lb.	.40 @	.42½
R & H 397	lb.	.75 @	.77½
R-2	lb.	1.95 @	2.15
Safex	lb.	1.20 @	1.25
SPDX	lb.	.75 @	—
Super-Sulphur No. 1	lb.		
No. 2	lb.		
Tensilac, No. 39	lb.	.40 @	.42½
Tensilac, No. 41	lb.	.50 @	.52½
Thermio F	lb.	.50 @	.55
Thiocarbanilid, drums	lb.	.25½@	.28½
Trimene	lb.	.75 @	—
base	lb.	1.20 @	—
Triphenylguanidine	lb.	.58 @	.62½
Tuads	lb.		
Ureka	lb.	.75 @	1.00
Vulcanex	lb.		
Vulcone	lb.		
Vulcanol	lb.		
Z-88-P	lb.	.50 @	.60
Zimate	lb.		

Inorganic

Lead, sublimed blue	lb.	.08¼@	—
Lead, white	lb.	.08½@	.08¾
Litharge, domestic	lb.	.07¾@	—
Magnesia, calcined, light	per 100 lb.	5.35 @	5.45
heavy	per 100 lb.	3.65 @	3.75

COLORS

Blacks (See Compounding Materials)

Blues

Prussian	lb.	.35 @	.36
Ultramarine	lb.	.06 @	.32

Browns

Sienna, Italian	lb.	.05½@	.12½
Umber, Turkey	lb.	.04½@	.07

Greens

Chrome, light	lb.	.30 @	.32
medium	lb.	.31 @	.33
dark	lb.	.34 @	.36
Chromium Oxide, bbl.	lb.	.34½@	.35½

Reds

Antimony crimson, 15/17	lb.	.40 @	.44
sulfur, free	lb.	.56 @	.66
golden 15/17 F.S.	lb.	.20 @	.25
Indian English	lb.	.08 @	.11
Domestic (Maroon)	lb.	.11 @	—
Oximony	lb.	.13¼@	—
Red oxide, pure	lb.	.10 @	.12
Smith's 444 Crimson f.o.b. Springfield	lb.	.08¾@	.10
Rub-Er-Red, f.o.b. Easton	lb.	.08¾@	—
Venetian red	lb.	.03 @	.06
Vermillion, quicksilver, English	lb.	1.75 @	1.80

Whites

Lithopone, Akcolith	lb.	.05 2/5@	.06
Lithopone, Albalith	lb.	.05¼@	.05¾
Lithopone, Azolith	lb.	.05¼@	.05¾
Lithopone, Vanolith	lb.	.05¾@	—
Titanox B, f.o.b. St. Louis,	lb.	.07¼@	.07¾
Titanox C, f.o.b. St. Louis,	lb.	.07¾@	.08¼

Zinc Oxide—American Process

American Azo: ZZZ (lead free)	lb.	.06½@	.07
ZZ (leaded)	lb.	.06⅝@	.06⅞
Horsehead Brand: Special	lb.	.07 @	.07½
XX Green	lb.	.07 @	.07½
XX Red, lead free	lb.	.06½@	.07
Kadox, black label	lb.	.10⅜@	.10⅞
blue label	lb.	.09⅜@	.09⅞
red label	lb.	.08 @	.08½

Zinc Oxide—French Process

White seal	lb.	.11⅝@	.11⅞
Green seal	lb.	.10⅜@	.10⅞
Red seal	lb.	.09⅜@	.09⅞

Yellows

Chrome	lb.	.17 @	.17½
Ocher, French medium	lb.	.02 @	.03
domestic	lb.	.01¾@	.02

COMPOUNDING MATERIALS

Aluminum Flake	ton	21.85 @	24.50
Ammonia carbonate, lump	lb.	.07½@	.07¾
Asbestine	ton	14.75 @	18.00
Barium carbonate	lb.	.03½@	.05
Barium Dust	lb.	.05 @	.06
Barytes southern off-color	ton	12.00 @	18.00
Western prime white	ton	23.00 @	—
imported	ton	27.00 @	36.00
Basofor	lb.	.04½@	—
Bentonite	lb.	.02 @	.03

Blacks

Arrow "Aerfloted"	lb.	.04½@	.09½
Bone Black	lb.	.06 @	.12½
Carbon, compressed	lb.	.04 @	.08½
Carbon, uncompressed	lb.	.04 @	.08½
Disperso, f.o.b. Louisiana	lb.	.041 @	—
Disperso, f.o.b. Texas	lb.	.04 @	—
Drop Black	lb.	.06 @	.14
Fumonex	lb.	.04 @	.07½
Excello, compressed	lb.	.05 @	.09
Gastex, f.o.b. Texas	lb.	.04 @	.05¼
Lamp Black	lb.	.10 @	.40
Micronex	lb.	.04½@	.09½
Thermatomic-Thermax	lb.		
Flex	lb.		
P-33	lb.		
United carbon, fob Tex.	lb.	.04½@	.09½
Velvetex carbon	lb.	.03 @	.06
Blanc fixe dry f.o.b. works	ton	75.00 @	90.00
Carrara filler	lb.	.01¾@	.02
Catalpo (fact.)	lb.	.02 @	—
Clay, Kaolin, domestic	ton	8.00 @	9.00
Aerfloted, Suprex	ton	8.00 @	20.00
Colloidal	lb.	.05 @	.08
Congaree, c. l. f.o.b. mine	ton	9.00 @	—
Dark Blue Ridge	ton		
Dixie	ton		
Langford	ton		
Lexington	ton	10.00 @	22.00
Mineral Flour, c.l. f.o.b. mine	ton	20.00 @	23.00
Par	ton		
Tensulite		15.00 @	—
Glues, extra white	lb.	.22 @	.26
medium white	lb.	.20 @	.24
Magnesia, carbonate	lb.	.08¾@	.11
Mica, white water grnd.	lb.	.06 @	.08
Off color (biotite)	lb.	.05 @	.07
Rotten Stone (powdered)	lb.	.02 @	.05
Soapstone, powdered	ton	15.00 @	22.00
Starch, powdered	cwt.	3.62 @	3.92
Talc, domestic	ton	12.00 @	15.00
Pyrax A	ton		
Whiting, commercial	cwt.	— @	1.00
English cliffstone	cwt.	1.75 @	2.00
Quaker	ton		
Superfine	ton	10.00 @	12.00
Sussex	ton		
Witco	ton	20.00 @	—
Zinc Carbonate	lb.	.09½@	.10½
Zinc Stearate	lb.	.23 @	.24½

MINERAL RUBBER

Genasco (factory)	ton	50.00 @	52.00
Granulated M. R.	ton		
Hard Hydrocarbon	ton		
Paradura	ton	62.50 @	65.00
Parmr, solid	ton	28.00 @	48.00
Pioneer, MR, solid	ton	40.00 @	42.00
Pioneer-granulated	ton	50.00 @	52.00
R & H Hydro-Carbon	ton	27.95 @	29.00
Robertson, MR, solid	ton	34.00 @	80.00
M.R. (gran)	ton	38.00 @	80.00

SOFTENERS

Acids

Nitric, 36 degrees	cwt.	5.00 @	5.25
Sulfuric, 66°	cwt.	1.60 @	1.95
Tartaric, crystals	lb.	.34½@	.36

Acids, Fatty

Laurex	lb.	.15 @	.16
Stearex	lb.	.13 @	.17
Stearic, double pressed	lb.	.17 @	.22

Alkalies

Caustic soda, 76%	cwt.	3.76 @	3.91
Soda ash, 58% C.L.	cwt.	1.40 @	

Oils

Corn, refined, bbls.	lb.	.08 @	.09¾
Cottonseed, crude		.07 @	.07¼
Cyclite	gal.	.27 @	.34
Degras (c.l. 100 bbls.)	lb.	.03¾@	—
Less c.l. (10-25 bbls.)	lb.	.04 @	—
Lots less than 10 bbls.	lb.	.04¼@	.04½
Fluxrite	lb.	.05½@	.06½
Palm Lagos	lb.	— @	.07
Niger	lb.	.05¼@	.05¼
Para-Flux	gal.	.17 @	—
Petrolatum, white	lb.	.08 @	.08½
Pigmentaroil	gal.	.15 @	.20
Pine, steam distilled	gal.	.65 @	.70
destructively distilled	gal.	.50 @	.55
Witco Palm Oil	lb.	.11 @	—
Witco Softener (f.o.b. wks.)	lb.	.02 @	—

Resins and Pitches

Pitch, Burgundy	lb.	.06½@	.07½
coal tar	gal.	.06½@	.06
pine, 200 lb. gr. wt.	bbl.	7.00 @	—
Rosin, grade K, 280 lb.	bbl.	— @	6.12½
Pigmentar	gal.	.16 @	.21
Tar Retort, 50 gal.	bbl.	13.50 @	15.00

Solvents

Acetone, pure	lb.	.11 @	.12
Alcohol denatured, No. 1 bbls.	gal.	.40 @	.44
Benzol, 90%	gal.	.21 @	.23
Carbon bisulphide	lb.	.05½@	.06¼
Carbon tetrachloride	lb.	.06¼@	.07
Dryolene (f.o.b. Okla.)	gal.	.10 @	.10½
Gasoline, steel bbls.	gal.	.16 @	—
Naphtha, solvent	gal.	.35 @	.40
Rub-Sol (f.o.b. Okla.)	gal.	.09 @	—
Turpentine, spirits	gal.	.44 @	.46½
wood	gal.	.39 @	.44
destructively distilled	gal.	.34 @	.35

Waxes

Beeswax, white	lb.	.51 @	.53
Carnauba	lb.	.30 @	.34
Ceresin, white	lb.	.10 @	.11
Montan, crude	lb.	.06½@	.07
Ozokerite, black	lb.	.24 @	.25
green	lb.	.26 @	.30

Paraffin (c. l.—f.o.b. N. Y.)

Yellow crude scale	lb.	.02½@	—
White crude scale 124/126	lb.	.02½@	—
Refined, 125/127	lb.	.03¾@	—
Refined, 128/130	lb.	.03¾@	—
Refined, 135/137	lb.	.05¼@	—
Refined, 138/140	lb.	.07¼@	—

ANTI-OXIDANTS

Agerite, Resin	lb.		
Powder	lb.		
White	lb.		
Albasan	lb.	.70 @	.75
Antox	lb.		
B-L-E	lb.	.57 @	.60
Neozone	lb.		
Oxynone	lb.	.68 @	.80
Resistox	lb.	.54 @	.57
Stabilite	lb.	.57 @	.62
Stabilite Alba	lb.	.70 @	.75
VGB	lb.	.55 @	.66

SPECIALTIES

Sunproof	lb.	.35 @	.37½
Sponge Paste	lb.	— @	.30
Tonox	lb.	.56 @	.60

SUBSTITUTES

Black	lb.	.08 @	.14
White	lb.	.10 @	.16
Brown	lb.	.08 @	.15

VULCANIZING INGREDIENTS

Sulfur Chloride (drums)	lb.	.03½@	.04½
Sulfur flour, Ref'n'd, 100% pure (bags)	cwt.	2.40 @	2.75
Commercial (bags)	cwt.	1.75 @	2.10
Vandex	lb.		

TIRES & TUBES
CRUDE RUBBER

STATISTICAL SECTION

AUTOMOBILES
GASOLINE

THERE is no escape from the fact that stocks of crude rubber the world over are rising steadily to unprecedented proportions. Early this month Symington & Sinclair, London brokers, estimated that world stocks had reached a total of approximately 498,000 long tons, which does not seem too high when inventories in foreign countries not generally computed are taken into consideration.

British warehouse stocks continue their upward trend. The total for London and Liverpool on September 25 was 117,994 long tons as compared with 114,039 long tons on September 13. Stocks at Singapore and Penang and on the Malaya Mainland were all higher on August 31 than at the end of July, while stocks afloat for Europe were estimated by the Department of Commerce at 29,000 long tons at the end of August as against 27,290 long tons on July 31.

Meanwhile, August automobile production was the lowest for the year and August gasoline consumption failed to come up to the high mark set during July. The domestic tire industry is still holding back its production schedules, although sales have shown an upward trend over the past two months.

Latest figures covering exports and imports from the leading producing and consuming countries have been added to the appropriate tables in this section.

PLAN OF THE SECTION

The statistics included in this section have been chosen for their constant importance to the rubber industry. The tables are reprinted in the same relative position in every issue, each table being kept current by the addition of new figures as soon as they become available.

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U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Gross Imports: Total Declared Value	Gross Imports: Average Declared Value per pound Cents	Re-exports: Long Tons	Re-exports: Total Declared Value	Re-exports: Average Declared Value per pound Cents	Net Imports: Long Tons
1921	185,394	78,772,677	17.76	5,716	2,414,924	18.86	179,678
1922	301,076	101,843,188	15.10	4,809	1,921,828	17.84	296,267
1923	809,144	185,060,304	26.72	8,772	5,672,819	28.87	800,372
1924	326,056	174,281,331	28.71	10,309	6,057,637	26.23	317,747
1925	396,642	429,705,014	48.36	14,827	19,847,753	59.76	381,815
1926	413,338	505,817,807	54.63	17,671	22,470,583	56.77	395,667
1927	426,258	339,874,774	35.60	27,775	24,735,438	39.76	398,483
1928	439,731	244,854,973	25.02	32,159	18,128,861	25.17	407,572
1929	560,084	239,178,783	19.15	36,485	16,868,783	20.64	523,599
1928:							
Jan.	39,107	30,278,444	34.56	1,988	1,734,990	38.95	37,119
Feb.	33,663	27,763,655	36.82	2,738	2,229,589	36.35	30,925
Mar.	40,611	32,103,042	35.29	3,718	2,587,435	31.07	36,893
Apr.	37,935	27,287,266	32.11	2,272	1,415,024	27.80	35,663
May	31,059	19,058,672	27.39	2,399	1,386,307	25.80	28,660
June	27,765	14,121,219	22.71	2,621	1,400,697	23.86	25,144
July	31,258	14,144,765	20.20	3,087	1,451,446	20.99	28,171
Aug.	31,204	12,860,150	18.39	2,377	1,034,646	20.37	28,827
Sept.	39,235	16,512,019	18.50	3,038	1,384,148	20.34	36,797
Oct.	44,958	18,200,332	18.44	3,405	1,085,407	20.15	41,653
Nov.	36,519	14,878,441	18.19	2,788	1,207,089	18.52	33,731
Dec.	43,511	17,580,966	18.04	2,738	1,165,743	19.00	40,773
1929:							
Jan.	57,564	22,872,943	17.74	3,663	1,773,401	21.61	53,901
Feb.	64,265	24,760,111	17.20	2,955	1,374,783	20.77	61,310
Mar.	50,604	20,330,905	17.98	4,218	2,094,037	22.16	46,386
Apr.	55,725	25,542,726	20.46	3,293	1,624,237	22.02	52,432
May	51,161	24,355,511	21.25	2,336	1,349,690	21.24	48,825
June	41,663	18,799,307	20.14	3,152	1,470,746	20.83	38,511
July	43,944	19,342,147	19.65	3,424	1,590,411	20.73	40,520
Aug.	37,222	16,530,690	19.83	2,644	1,232,217	20.80	34,578
Sept.	34,472	15,214,485	19.70	2,011	861,068	19.11	32,461
Oct.	36,163	16,192,261	18.94	2,614	1,190,510	20.33	35,549
Nov.	43,507	18,189,305	18.66	2,929	1,300,354	19.82	40,578
Dec.	42,952	17,573,330	18.27	2,745	1,007,279	16.38	40,207
1930:							
Jan.	47,496	17,793,563	16.72	3,144	1,077,415	15.30	44,352
Feb.	42,687	14,798,240	15.48	2,280	960,790	18.80	40,407
Mar.	44,976	14,653,243	14.54	3,187	1,192,708	16.71	41,789
Apr.	45,423	14,783,605	14.53	2,688	892,532	14.82	42,735
May	42,692	13,373,232	13.98	3,154	1,085,432	15.37	39,538
June	39,993	12,215,845	13.79	3,125	1,027,186	14.67	36,868
July	35,182	10,553,944	13.39	2,732	736,863	12.04	32,450
Aug.	35,713	9,666,362	12.08	2,194	646,667	13.16	33,519
Sept.							
Oct.							
Nov.							
Dec.							

U. S. Consumption of Crude Rubber

(Rubber Manufacturers' Association statistics raised to 100 per cent—All figures in long tons)

Figures on Monthly Basis

	1923	1924	1925	1926	1927	1928	1929	1930
Jan.	30,106	29,058	29,638	32,196	31,518	34,403	43,062	36,660
Feb.	30,149	25,736	29,761	31,136	30,137	33,702	41,594	32,726
Mar.	36,629	28,385	33,498	32,936	36,141	35,685	44,730	35,914
Apr.	29,085	27,129	34,139	32,696	35,871	32,772	47,521	40,297
May	36,155	25,845	35,322	29,364	34,592	37,333	49,233	39,902
June	24,272	22,753	35,822	28,598	33,801	37,676	43,227	34,469
July	17,685	23,396	36,053	27,577	29,219	37,407	41,526	29,245
Aug.	20,359	28,982	35,909	34,533	33,460	42,927	38,274	30,575
Sept.	17,594	31,497	31,691	32,904	27,214	39,882	34,707	
Oct.	21,321	31,520	29,047	29,836	26,790	40,857	34,800	
Nov.	20,437	27,289	28,853	28,080	26,792	37,461	27,659	
Dec.	31,902	27,199	28,748	26,293	25,492	31,232	23,531	
Totals	305,694	328,769	388,481	366,149	371,027	441,340	469,804	

Figures on Quarterly Basis

Quarter	1923	1924	1925	1926	1927	1928	1929	1930
Jan./Mar.	96,776	87,609	95,263	94,301	99,216	103,558	128,565	101,618
Apr./June	89,493	75,674	104,099	87,109	103,242	103,500	139,292	112,093
July/Sept.	55,621	83,813	99,493	93,793	89,210	117,573	113,746	
Oct./Dec.	63,617	92,656	85,789	83,212	80,860	117,597	84,872	
Totals	305,507	339,752	384,644	358,415	372,528	442,227	466,475	

Note—The Rubber Association estimates its monthly rubber consumption figures to be 90 per cent complete. Up until 1925 the quarterly figures were likewise estimated to be 90 per cent complete; beginning with 1925 an estimate of 92 per cent completeness has been used. These estimates have been used in raising the figures in this table to 100 per cent. The quarterly figures are generally regarded as the most authentic; the monthly figures may be accepted as preliminary.

Rubber Invoiced to the U. S.

(Reported by American Consuls—Quantities in Long Tons)

During the Week Ended	From Br. Malaya	From Ceylon	From Dutch East Indies	From London & Liverpool	Total
July 12	6,594	215	1,537	6	8,452
July 19	4,898	270	1,317	22	6,507
July 26	5,495	435	1,521	—	7,451
August 2	6,531	914	996	7	8,448
August 9	5,397	914	1,939	—	8,250
August 16	6,177	820	1,810	25	8,832
August 23	7,498	488	1,503	—	9,489
August 30	5,796	1,043	1,662	—	8,501
September 6	8,963	1,607	1,724	—	12,294
September 13	5,879	1,177	2,001	20	9,077
September 20	5,214	1,229	1,314	20	7,777
September 27	4,367	729	1,762	—	6,858

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave
1928																															
May	17½	17⅝	18¼	19¼	—	18⅝	19¼	18⅝	18⅝	18⅝	18⅝	—	19	19	19	19¼	18⅝	18⅝	19⅜	19⅜	18⅝	19⅜	19⅜	19⅝	20	19¾	19¾	20	19¾	19¾	19
June	19¾	19¾	—	19¾	19¾	19¾	—	19¾	—	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½
July	18⅞	18⅞	18⅞	19¼	19	19⅝	20	—	19⅞	19⅞	19⅞	19⅞	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19	19	19	19⅛
August	19½	19½	19⅝	19⅝	19⅝	18⅝	—	18⅝	18⅝	18⅝	18⅝	18⅝	18½	18½	18½	19	19	19	19	19	19	19	19	19	19	19	19	19	19	18⅝	18⅝
September	—	—	—	19	18⅝	18⅝	18⅝	—	18⅝	18⅝	19	19	19	19	19	19	19	19	19	19	19	19	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	17⅞	17⅞	18⅝
October	18⅝	18½	18½	18⅝	—	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
November	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝
December	17⅝	—	17⅝	17⅝	17⅝	18⅛	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
1929																															
January	—	18⅛	18⅛	18⅛	18⅛	18⅛	18⅝	18⅛	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝
February	22⅝	22	—	21⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝
March	26	26	26	26	26	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝
April	23	23¼	22½	22½	22½	22½	22½	22½	22½	22½	21⅞	21⅞	21⅞	21⅞	21⅞	21⅞	21⅞	21⅞	21⅞	21⅞	21⅞	21⅞	21⅞	21⅞	21⅞	21⅞	21⅞	21⅞	21⅞	21⅞	21⅞
May	19⅞	19⅝	19⅝	19⅝	—	20⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛
June	21⅝	21⅝	21⅝	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾	21¾
July	20⅝	21¼	21	—	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
Aug.	21	21	21	20¼	20¼	20¼	20¼	20¼	20¼	20¼	20¼	20¼	20¼	20¼	20¼	20¼	20¼	20¼	20¼	20¼	20¼	20¼	20¼	20¼	20¼	20¼	20¼	20¼	20¼	20¼	20¼
Sept.	19⅝	19½	19½	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝
Oct.	17⅝	17⅝	17⅝	17⅝	—	17⅝	16⅝	—	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝
Nov.	—	16¼	16¼	16¼	16¼	16¼	—	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼
Dec.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1.30																															
January	—	15⅞	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝
February	15¼	—	—	15	15	15¼	15¼	—	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼
March	15⅝	—	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝
April	15½	15½	15½	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼	15¼
May	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝
June	—	13¾	13¾	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝
July	12¼	12¾	12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
August	10⅝	10⅝	—	10½	10½	10½	—	—	10½	10¼	10¼	10¼	10¼	10¼	10¼	10¼	10¼	10¼	10¼	10¼	10¼	10¼	10¼	10¼	10¼	10¼	10¼	10¼	10¼	10¼	10¼
September	—	9⅝	9⅝	9⅝	9	8½	—	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝
October	7½	7⅝	8¼	8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Market)

Average Price per Pound for Years 1910-1921

Year	Cents	Year	Cents	Year	Cents
1910	206.60	1914	65.33	1918	60.15
1911	141.30	1915	65.35	1919	45.70
1912	121.60	1916	72.50	1920	36.30
1913	82.04	1917	72.23	1921	16.38

Average Monthly Price per Pound Since 1922

Months	1922 Cents	1923 Cents	1924 Cents	1925 Cents	1926 Cents	1927 Cents	1928 Cents	1929 Cents	1930 Cents
Jan.	18.82	32.73	25.86	36.71	79.50	38.75	40.25	20.14	15.24
Feb.	16.12	35.14	25.29	36.01	62.25	38.25	32.75	23.97	15.85
Mar.	14.53	34.21	22.83	41.00	59.00	41.04	26.32	24.55	15.34
Apr.	15.99	32.48	22.51	43.64	51.25	40.86	18.97	21.13	14.98
May	15.25	27.39	18.89	58.47	47.75	40.76	18.99	21.46	14.24
June	15.11	26.88	18.81	77.26	42.50	37.25	19.59	20.64	12.45
July	14.67	26.10	22.16	103.16	41.03	34.87	19.40	21.30	11.24
Aug.	13.93	28.84	26.17	82.99	38.50	35.12	19.46	20.59	9.96
Sept.	14.44	28.95	27.56	88.88	41.00	33.67	18.47	20.37	8.28
Oct.	19.78	26.93	31.13	98.01	42.50	34.32	18.83	19.67	—
Nov.	23.88	27.14	34.33	104.80	38.50	37.58	18.26	16.62	—
Dec.	27.42	26.60	37.88	98.51	38.25	40.63	17.97	16.12	—
Average for Year	17.50	29.45	26.20	72.46	48.50	37.72	22.43	20.55	—

London Closing Prices of Ribbed Smoked Sheet

(In Pence Per Pound)

Day	July	Aug.	Sept.	Oct.	Day	July	Aug.	Sept.	Oct.
1	6⅛	5⅛	—	3⅝	17	6½	—	4⅛	—
2	6⅛	5⅛	4¾	3¾	18	5⅝	4¾	4⅛	—
3	6⅛	—	4⅝	4	19	5⅝	4¾	4	—
4	6⅛	5¼	4½	4	20	—	4¾	—	—
5	6⅛	5	4½	—	21	5⅝	4⅞	—	—
6	—	5	4⅛	—	22	5⅝	4¾	3⅞	—
7	6⅛	5	—	—	23	5⅝	4¾	3⅞	—
8	6	5	4	—	24	5½	—	3⅞	—
9	5⅞	5	4⅛	—	25	5⅝	4¾	3⅞	—
10	5⅞	—	4	—	26	5⅝	4¾	3⅞	—
11	5⅞	4⅞	4¼	—	27	—	4¾	3⅞	—
12	5¾	4¾	4⅛	—	28	5¼	4¾	—	—
13	—	4¾	4	—	29	5¼	4¾	3¾	—
14	5⅝	4⅞	—	—	30	5¼	—	3⅝	—
15	5⅝	5	4	—	31	5¼	—	—	—
16	5½	4⅞	4⅛	—					

Average Monthly Price Per Pound

Month	1928 Pence	1929 Pence	1930 Pence	Month	1928 Pence	1929 Pence	1930 Pence
Jan.	19.310	9.942	7.471	Aug.	9.300	10.505	4.880
Feb.	15.713	11.875	7.948	Sept.	8.530	10.160	4.075
Mar.	12.736	12.135	7.595	Oct.	8.807	9.620	—
Apr.	8.864	10.490	7.391	Nov.	8.596	8.442	—
May	8.845	10.717	6.926	Dec.	8.570	7.958	—
June	9.293	10.580	6.195	Average for Year	10.656	10.291	—
July	9.312	11.065	5.648				

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Day of Month	Sept.	Oct.	Day of Month	Sept.	Oct.	Day of Month	Sept.	Oct.
1	—	10.50	11	11.30	—	21	—	—
2	11.30	10.55	12	11.05	—	22	10.75	—
3	11.40	10.50	13	11.00	—	23	10.65	—
4	11.45	10.35	14	—	—	24	10.55	—
5	11.65	—	15	11.05	—	25	10.55	—
6	11.65	—	16	10.95	—	26	10.35	—
7	—	—	17	11.00	—	27	10.30	—
8	11.25	—	18	11.00	—	28	—	—
9	11.20	—	19	10.90	—	29	10.25	—
10	11.50	—	20	10.85	—	30	10.35	—
						31	—	—

Average Monthly Price Per Pound

Month	1928 Cents	1929 Cents	1930 Cents	Month	1928 Cents	1929 Cents	1930 Cents
Jan.	19.12	20.22	17.21	Aug.	19.28	18.62	12.03
Feb.	18.40	20.21	15.62	Sept.	18.67	18.83	10.85
Mar.	19.38	20.19	15.13	Oct.	19.62	18.46	—
Apr.	20.63	20.29	16.39	Nov.	19.84	17.53	—
May	21.58	19.41	16.43	Dec.	20.22	17.28	—
June	21.50	18.74	14.48	Average for Year	19.97	19.03	—
July	21.36	18.62	13.10				

World Stocks of Crude Rubber

ON HAND OR AFLOAT TO THE U. S.

At End of	ON HAND			AFLOAT			ON HAND AND AFLOAT		
	1928	1929	1930	1928	1929	1930	1928	1929	1930
Jan.	110,244	76,342	126,068	46,441	93,330	65,483	156,685	169,672	191,551
Feb.	108,955	90,058	134,790	45,044	75,790	71,015	156,999	165,848	205,805
Mar.	114,061	100,536	141,843	43,378	67,065	63,646	157,439	167,601	205,489
Apr.	113,088	107,659	148,272	32,783	65,798	63,261	145,866	173,457	211,533
May	105,356	97,192	146,179	33,145	65,793	68,168	138,501	162,985	214,347
June	90,198	92,061	151,485	38,392	54,668	58,657	128,590	146,729	210,142
July	83,242	92,535	152,001	42,943	46,145	58,826	126,185	138,680	210,827
Aug.	68,994	90,769	158,178	54,904	49,423	61,168	123,898	140,192	219,346
Sept.	68,851	84,362		52,692	52,758		121,543	143,120	
Oct.	66,421	88,483		45,646	59,180		112,067	147,663	
Nov.	61,956	92,219		75,502	62,358		137,458	154,577	
Dec.	66,166	118,609		92,037	62,388		158,203	180,997	

(Rubber Manufacturers' Association figures raised to 100%.)

STOCKS IN GREAT BRITAIN

Stocks in London

(No. of Tons in Wharves and Warehouses, including Latex)

At end of	1928	1929	1930	At end of	1928	1929	1930
Jan.	66,524	25,191	60,434	July	35,429	30,080	31,048
Feb.	62,964	25,554	64,557	Aug.	32,084	35,605	
Mar.	58,272	28,214	68,923	Sept.	31,440	42,188	
Apr.	53,425	31,368	74,676	Oct.	24,207	47,803	
May	44,628	31,290	77,312	Nov.	17,775	52,454	
June	38,756	31,025	80,260	Dec.	19,815	54,304	

At End of Recent Weeks

	First Saturday	Second Saturday	Third Saturday	Fourth Saturday	Fifth Saturday
1930					
April	71,477	72,333	73,252	74,084	
May	75,540	76,118	76,932	76,953	77,108
June	77,616	78,104	78,888	79,699	
July	80,060	80,501	80,814	80,845	
August	80,379	80,044	80,224	80,618	80,611
September	81,830	82,233	82,648	83,136	

Stocks in Liverpool

1930					
April	22,008	22,676	22,663	23,546	
May	23,877	23,755	24,448	24,722	25,526
June	25,320	26,646	27,354	27,493	
July	28,143	28,226	28,126	28,581	
August	28,404	28,660	29,048	29,673	29,789
September	31,159	31,796	34,085	34,858	

STOCKS IN PENANG AND SINGAPORE

(Stocks held by Dealers—Quantities in Long Tons)

End of	1928	1929	1930	End of	1928	1929	1930
Jan.	25,868	29,617	39,727	July	18,663	33,859	45,459
Feb.	22,867	32,373	44,371	Aug.	18,971	30,834	48,132
Mar.	20,538	29,437	45,657	Sept.	14,898	32,138	—
Apr.	16,946	26,474	48,473	Oct.	12,149	33,770	—
May	17,437	30,764	44,715	Nov.	29,188	30,963	—
June	18,207	30,403	42,451	Dec.	32,895	35,548	—

STOCKS IN OTHER CENTRES

1930 End of	Malaya Mainland	Afloat for Europe	Holland	Colombo	Para and Manaos
Jan.	44,740	28,440	2,134	5,400	3,668
Feb.	41,955	28,180	2,189	5,000	4,870
Mar.	39,206	27,510	2,220	4,759	4,578
Apr.	39,758	28,580	2,204	4,000	4,482
May	36,482	22,730	2,308	4,000	4,388
June	36,578	20,920	2,316	3,856	4,588
July	38,311	27,290	2,312		4,665
Aug.	39,482	29,000*			4,499

*Subject to revision.

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total	Per Cent Balloons		Total	Per Cent Balloons
1922	16,297,785	0.0	1926	24,199,524	78.8
1923	23,140,620	0.6	1927	19,700,003	79.1
1924	21,863,311	19.7	1928	24,247,282	81.6
1925	28,001,664	66.8	1929	24,141,502	80.3
1930			1930		
January	1,601,326	84.6	July	1,449,161	80.7
February	1,658,421	78.9	August	1,504,187	78.1
March	2,061,999	79.1	September		
April	2,339,834	81.1	October		
May	2,010,067	84.3	November		
June	1,838,226	83.5	December		

U. S. Tire and Tube Statistics

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Figures for Recent Years

	1922	1923	1924	1925	1926	1927	1928	1929
Production	40,932	45,259	51,633	60,845	61,237	64,439	77,944	73,309
Shipments	39,987	45,204	50,120	59,262	59,002	64,059	74,296	74,021
Inventory[2]	6,132	5,772	7,427	8,142	10,456	10,264	13,624	12,627

Figures for Recent Months

	PRODUCTION			SHIPMENTS			INVENTORY		
	1928	1929	1930	1928	1929	1930	1928	1929	1930
Jan.	5,358	6,722	4,745	5,394	6,626	4,701	9,949	13,712	12,719
Feb.	6,363	6,912	4,859	5,031	5,282	4,474	11,721	15,495	13,231
Mar.	6,819	7,519	5,188	5,731	6,708	5,032	12,389	16,351	13,481
Apr.	6,178	7,884	6,024	5,812	7,294	5,429	12,717	16,929	13,948
May	6,759	8,145	6,099	6,457	7,184	5,564	13,024	17,849	14,327
June	6,692	7,304	5,464	7,117	7,254	5,647	12,162	17,957	14,161
July	6,498	6,475	4,257	7,895	7,855	5,810	11,157	15,830	12,599
Aug.	7,469	5,806	—	8,403	7,845	—	10,084	14,226	—
Sept.	6,802	4,758	—	7,145	5,998	—	9,765	12,875	—
Oct.	7,326	4,919	—	5,717	4,960	—	11,520	12,845	—
Nov.	6,075	3,603	—	4,998	3,558	—	12,579	12,935	—
Dec.	5,605	3,261	—	4,591	3,346	—	13,624	12,627	—

AUTOMOBILE INNER TUBES

Figures for Recent Years

	1922	1923	1924	1925	1926	1927	1928	1929
Production	50,850	60,116	70,706	82,614	76,618	70,823	80,180	73,417
Shipments	49,673	59,072	68,016	81,004	71,591	72,896	77,127	75,296
Inventory[2]	7,643	8,425	11,052	11,313	16,200	13,692	16,117	13,660

Figures for Recent Months

	PRODUCTION			SHIPMENTS			INVENTORY		
	1928	1929	1930	1928	1929	1930	1928	1929	1930
Jan.	5,441	6,517	4,914	6,072	7,242	5,181	12,982	15,386	13,551
Feb.	6,895	6,769	4,943	5,431	5,278	4,627	14,650	16,999	13,905
Mar.	6,231	7,466	5,271	5,731	6,737	5,042	15,573	17,750	14,057
Apr.	6,661	7,634	5,877	5,702	7,164	5,172	16,638	18,134	14,704
May	7,168	7,660	5,904	6,300	7,038	5,412	17,702	18,923	14,775
June	6,953	6,978	5,280	7,136	6,950	5,616	17,159	17,741	14,513
July	6,674	6,178	4,201	8,729	8,113	6,246	14,974	16,332	12,434
Aug.	8,343	5,846	—	9,350	8,183	—	13,931	14,157	—
Sept.	7,103	5,536	—	7,154	6,250	—	13,543	13,424	—
Oct.	6,929	5,310	—	5,662	5,001	—	15,285	13,656	—
Nov.	5,592	3,780	—	5,002	3,712	—	15,743	13,701	—
Dec.	5,184	3,716	—	4,858	3,631	—	16,117	13,660	—

(1) Rubber Manufacturers' Association figures, raised to 100%. The Association estimates its figures to be 75% representative or complete when issued and that basis has been accepted when preparing the statistics in this table.

(2) Held by manufacturers at end of period indicated.

Automobile Production

	United States			Canada			Grand Total
	Total	Passenger Cars	Trucks	Total	Passenger Cars	Trucks	
1923	4,020,255	3,631,728	388,527	146,438	129,228	17,210	4,166,693
1924	3,600,918	3,203,049	397,869	135,246	117,765	17,481	3,736,164
1925	4,265,704	3,760,459	505,245	161,389	139,311	22,078	4,427,093
1926	4,298,799	3,808,753	490,046	205,092	164,483	40,609	4,503,891
1927	3,393,887	2,938,868	453,019	179,426	146,870	32,556	3,573,313
1928	4,857,384	3,826,613	530,771	242,382	196,737	45,645	4,599,944
1929							
Jan.	402,154	350,617	51,537	21,501	17,164	4,337	423,655
Feb.	466,084	407,589	58,495	31,287	25,584	5,703	497,371
March	584,733	513,266	69,559	40,621	32,833	7,788	625,354
April	620,656	538,679	81,977	41,901	34,392	7,509	662,557
May	603,969	516,055	86,596	31,559	25,129	6,430	635,528
June	545,252	453,956	91,296	21,492	16,511	4,981	566,744
July	500,331	427,213	73,118	17,461	13,600	3,861	517,792
Aug.	499,629	444,711	54,918	14,214	11,037	3,177	513,843
Sept.	415,332	365,651	49,681	13,817	10,710	3,107	429,149
Oct.	380,011	321,195	58,816	14,523	8,975	5,548	394,534
Nov.	217,570	170,928	46,642	9,424	7,187	2,237	226,994
Dec.	119,950	92,717	27,233	5,495	4,426	1,069	125,445
TOTAL	5,358,361	4,603,609	754,752	263,295	207,498	55,797	5,621,656
1930							
Jan.	273,089	235,099	37,990	10,388	8,856	1,532	283,477
Feb.	323,962	276,833	47,129	15,548	13,021	2,527	339,510
March	401,378	336,178	64,200	20,730	17,165	3,565	422,108
April	442,630	375,171	67,459	24,257	20,872	3,385	466,887
May	417,154	362,784	54,370	24,672	21,251	3,421	441,826
June	335,475	289,704	45,771	15,090	12,194	2,896	350,565
July	262,363	222,700	39,663	10,188	8,556	1,632	272,551
Aug.	223,046	187,288	35,758	9,792	6,946	2,846	232,838
Sept.							
Oct.							
Nov.							
Dec.							

Exports of Crude Rubber from Principal Producing Countries

(Long Tons)

	BRITISH MALAYA[1]								DUTCH EAST INDIES[2]						
	Gross Exports	Imports	Gross Exports Minus Imports	Ceylon[3]	India & Burma[4]	Sarawak[4]	British North Borneo[4]	Siam[4]	Java & Madura	Sumatra E. Coast	Other D.E.I.	Indo-China[4]	Amazon Valley	All Other[4]	World Total[5]
1923	252,016	70,432	181,584	89,971	6,416	5,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,955
1924	259,706	108,524	151,182	89,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,683	23,165	9,065	429,369
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	517,523
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,530
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,582	5,472	55,297	77,315	142,171	8,645	28,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58,848	82,511	121,770	9,548	21,129	10,690	653,794
1929	574,836	163,092	411,744	81,584	11,663	11,077	7,381	5,018	65,990	87,789	134,037	9,696	21,148	6,767	853,894
1928:															
June	22,994	16,168	6,826	8,107	963	926	494	451	5,419	5,863	13,655	725	1,399	980	40,788
July	30,481	13,383	17,098	5,129	1,043	905	593	366	5,602	7,566	11,594	698	1,264	873	52,781
Aug.	35,674	15,114	20,560	5,720	398	1,227	593	544	5,668	7,438	11,893	712	1,732	450	56,926
Sept.	29,769	11,239	18,530	4,675	457	928	594	447	4,956	6,536	9,863	969	1,614	494	50,078
Oct.	24,476	12,603	11,873	3,999	864	949	564	457	5,295	7,474	10,124	513	1,399	732	44,243
Nov.	68,135	10,436	57,699	8,005	1,048	772	564	425	4,950	7,902	7,805	943	1,790	623	92,526
Dec.	66,763	11,122	55,641	7,848	1,113	744	565	294	5,120	8,792	10,896	948	2,220	588	94,769
1929:															
Jan.	52,546	13,415	39,131	8,301	1,664	873	600	461	5,640	8,067	11,076	850	2,134	642	79,439
Feb.	47,926	12,103	35,823	7,064	1,117	955	600	495	6,572	7,511	10,384	807	2,104	520	73,982
Mar.	49,448	14,553	34,895	6,583	1,413	758	601	499	5,515	6,620	10,629	658	2,332	786	71,289
Apr.	49,816	11,414	38,402	5,097	727	747	543	306	5,997	6,645	11,321	673	1,950	569	72,982
May	43,960	15,593	28,367	5,723	800	966	543	453	6,264	6,961	13,437	1,059	1,922	733	67,238
June	40,398	14,344	26,054	5,563	1,122	1,041	547	422	5,582	6,693	11,270	757	1,398	548	61,017
July	46,454	15,071	31,383	5,457	974	1,247	641	462	6,422	7,192	13,995	575	1,457	543	70,348
Aug.	50,441	15,469	34,972	6,079	685	993	641	431	4,644	7,298	10,782	1,032	1,563	499	69,619
Sept.	53,484	12,392	41,092	7,993	384	832	640	406	4,708	7,517	10,149	655	1,566	504	76,446
Oct.	47,987	12,516	35,421	8,381	812	1,047	671	485	4,697	8,295	10,512	893	1,606	445	73,265
Nov.	46,279	11,204	35,075	6,660	1,065	668	672	278	4,760	6,711	9,380	771	1,442	535	68,017
Dec.	46,147	15,018	31,129	8,683	900	930	672	320	5,189	8,279	11,102	966	1,674	443	70,287
1930:															
Jan.	52,535	11,773	40,762	7,741	1,560	791	600*	386	5,709	7,831	8,920	856	1,837	585	77,578*
Feb.	48,947	12,960	35,987	7,825	1,245	847	600*	469	6,900	7,191	11,414	944	1,797	480	75,599*
Mar.	47,320	13,236	34,084	6,269	1,129	976	600*	391	5,796	6,612	11,070	643	1,674	536	69,780*
Apr.	45,517	16,331	29,186	5,030	856	1,026	600*	366	4,802	6,326	12,582	433	1,201	630	63,038*
May	49,388	36,135	13,253	5,947	975	917	600*	350	6,352	6,661	11,916	753	1,383	555	49,662*
June	36,657	12,120	24,537	4,152	778	1,040	500*	392	4,728	4,776	9,512	425	974	551	52,365
July	41,347	12,759	28,588	4,619	792	1,087	500	327	6,022	5,891	9,770	648	810	418	59,472
Aug.	47,982	10,304	37,678	6,779		740	500	300	5,982	7,197	9,520	394	809		

(1) Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 115 tons in 1923, 1,117 in 1924, 3,618 in 1925, 3,263 in 1926, 2,439 in 1927 and 1,437 in 1928. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included— such shipments were equivalent to 18 tons in 1923, 93 tons 1924, 6 tons 1925, 20 tons in 1926, about ½ ton in 1927, and 1 ton in 1928. (3) Official statistics. (4) Imports into Singapore and Penang. (5) Exports from "Other D.E.I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 2,342 tons in 1923, 1,008 tons 1924, 2,239 tons 1925, 44 tons in 1926, 84 tons in 1927, and 1,459 tons in 1928. (6) Calculated from official import statistics of principal consuming countries, viz., United States, United Kingdom, France, Germany, Belgium and Netherlands. This figure includes guayule rubber. (7) This total includes the third column for British Malaya, "Gross Exports minus Imports," and all the figures shown for the other territories. *Figure is provisional; final figure will be shown immediately it becomes available.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(Long Tons)

	United States[1]	United Kingdom	France (b)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (ed)	Belgium (d)	Netherlands	Scandinavia (abedf)	Spain (g)	Czechoslovakia (abed)	World Total
1919	236,977	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	342,378
1920	248,762	56,844	13,885	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	370,641
1921	179,678	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	549	300,562
1922	296,267	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	-3,807	1,778	589	567	395,885
1923	300,372	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	408,018
1924	317,747	-11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	-807	3,178	944	1,370	414,847
1925	381,815	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	516,493
1926	395,667	84,865	34,240	22,775	20,229	18,125	9,809	6,329	9,021	2,498	2,670	4,046	1,299	1,870	613,643
1927	398,483	60,249	34,271	38,892	26,405	20,521	11,381	12,913	9,499	6,482	436	4,224	2,095	2,672	627,789
1928	494,496	4,846	36,498	37,855	30,447	25,621	12,423	15,134	8,499	7,968	2,243	4,418	3,178	3,135	686,996
1929	526,709	122,675	55,093	49,275	35,453	34,284	17,169	11,774	15,886	9,445	3,022	6,440	864	4,650	892,739
1928:															
May	28,660	—5,322	3,297	2,944	2,189	2,288	1,090	3,393	655	746	209	485	220	213	41,558
June	25,143	—3,031	3,597	2,968	2,186	2,102	934	4,111	848	743	133	346	251	182	40,963
July	28,170	—1,374	3,518	3,387	2,692	2,026	1,598	724	591	895	395	294	175	284	43,475
Aug.	28,827	48	3,527	2,744	2,447	1,848	875	632	707	519	316	359	58	94	43,021
Sept.	36,800	4,199	3,524	3,553	2,812	1,837	1,278	20	603	597	345	397	277	235	56,457
Oct.	41,667	—934	3,728	4,386	2,943	3,711	1,049	98	768	696	141	527	250	318	59,148
Nov.	33,846	—3,141	3,278	3,694	2,799	2,150	1,340	689	837	544	31	557	252	232	46,988
Dec.	40,781	8,438	3,633	2,470	2,618	3,002	1,145	1,378	755	639	148	425	263	290	65,985
1929:															
Jan.	53,922	11,951	5,645	4,711	3,759	3,776	1,481	956	1,061	749	218	638	179	525	89,571
Feb.	61,881	5,179	5,001	4,618	2,966	2,727	1,259	684	1,131	627	113	226	115	356	86,270
Mar.	46,391	9,068	4,409	4,586	4,961	2,630	1,515	716	725	931	316	354	80	499	77,091
Apr.	52,447	8,295	4,854	5,851	3,177	2,308	1,407	703	1,518	750	144	956	40	445	82,395
May	48,350	5,112	3,152	3,682	2,937	2,314	1,417	996	1,437	854	201	468	37	277	71,234
June	38,676	4,787	6,814	3,948	3,075	1,593	1,624	695	2,215	672	687	507	24	429	65,787
July	40,914	4,993	4,839	3,559	3,205	2,388	2,023	1,056	2,918	1,039	253	519	30	465	68,201
Aug.	35,207	14,594	4,645	4,082	2,879	3,663	908	1,234	724	902	254	429	25	319	69,865
Sept.	32,171	17,010	3,889	4,691	1,908	3,511	1,224	1,235	853	672	253	361	91	477	68,346
Oct.	35,840	16,111	4,489	3,355	1,821	3,902	1,838	1,073	1,125	1,147	278	710	91	201	71,981
Nov.	40,972	13,141	3,082	3,776	2,709	3,221	1,275	1,226	1,453	361	253	595	62	313	72,439
Dec.	40,488	12,434	4,274	2,921	2,114	2,251	1,198	1,200	726	741	52	677	90	443	69,609
1930:															
Jan.	44,759	11,106	4,207	3,862	2,842	2,805	910	826	332	612	209	552	200*	577	73,799
Feb.	40,718	10,293	4,482	3,697	2,250	1,386	1,385	2,705	457	1,143	188	315	200*	239	69,458
Mar.	42,068	12,346	4,354	4,289	3,776	2,663	1,083	168	975	678	358	322	200*	263	73,543
Apr.	42,961	13,058	5,006	4,488	2,303	2,769	2,067	949	673	1,431	158	461	200*	255	76,735
May	40,287	9,861	5,238	4,379	2,593	2,699	1,279	1,677	64	1,250	230	274	200*	346	70,427
June	37,257	9,645	4,458	3,794	2,579	2,677	1,378	1,454	67	691	343	507	200*	282	65,332
July	32,785	7,650	3,311	3,449	3,347		197		84	989	172	756	200*		

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced 12 per cent in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1]United States imports of guayule are not included in this compilation; such imports amount to 4,305 tons in 1926; to 5,010 tons in 1927; to 3,076 in 1928; and to 1,231 tons in 1929. *Figure is provisional; final figure will be shown immediately it becomes available.

Domestic Production of Miscellaneous Rubber Goods

	Rubber Proofed Fabrics Yards	Rubber Heels Pairs	Rubber Soles Pairs	Mechanical Goods Shipments Dollars
1924	25,920,400	186,279,000	(1)	$45,615,000
1925	23,988,000	206,970,000	16,211,620(2)	64,277,000
1926	29,238,000	183,312,000	12,253,000	76,789,000
1927	57,872,000	201,014,000	27,160,000	65,625,000
1928	41,179,000	235,170,000	37,645,000	69,114,000
1929	50,731,000	232,126,000	34,499,000	74,770,000
1929:				
September	5,507,000	21,702,000	2,341,000	5,906,000
October	6,116,000	22,386,000	3,502,000	5,587,000
November	4,395,000	17,863,000	3,400,000	4,932,000
December	2,291,000	14,781,000	3,003,000	4,751,000
1930:				
January	3,281,000	15,470,000	3,496,000	5,169,000
February	3,441,000	14,172,000	2,338,000	5,376,000
March	3,570,000	15,439,000	2,582,000	5,981,000
April	4,029,000	17,762,000	2,593,000	5,989,000
May	3,597,000	15,603,000	1,939,000	6,163,000
June	3,379,000	15,795,000	2,734,000	5,318,000
July	2,940,000	15,117,000	2,663,000	4,910,000

(1) Not available; (2) Last 9 months only.
Source: "Survey of Current of Business of the Department of Commerce."

United States Imports of Guayule Rubber and Related Gums

(All quantities in Long Tons)

	Guayule		Balata		Jelutong		Gutta Percha	
	Tons	Dollars	Tons	Dollars	Tons	Dollars	Tons	Dollars
1919	1,490	760,690	727	937,038	3,332	2,213,964	2,900	1,068,698
1920	758	845,935	1,064	1,260,043	5,672	2,068,501	3,183	1,520,309
1921	58	26,945	814	1,077,859	1,745	851,893	985	333,564
1922	127	57,040	812	978,765	2,335	403,812	518	281,012
1923	1,155	542,227	700	898,524	4,565	853,808	912	375,167
1924	1,356	536,392	464	568,456	6,165	1,237,100	1,408	463,610
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	1,603	629,284
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	1,445	661,156
1927	5,018	2,674,957	582	447,246	7,785	2,448,657	1,494	728,172
1928	3,075	1,755,685	731	430,855	7,552	2,540,059	1,597	777,128
1929	1,231	545,175	728	566,964	8,203	2,458,126	447	167,479
1929:								
Sept.	107	51,156	38	30,327	913	279,225	—	—
Oct.	200	79,968	58	43,756	636	181,421	—	—
Nov.	125	47,796	13	11,600	583	182,677	49	14,935
Dec.	100	41,328	25	19,955	550	156,939	51	12,095
1930:								
Jan.	150	55,272	23	28,549	509	141,384	—	—
Feb.	75	25,956	52	45,319	367	93,087	—	—
Mar.	148	50,007	16	12,498	522	128,844	—	—
Apr.	75	19,856	58	54,548	410	103,089	—	—
May	172	57,760	17	13,645	602	144,415	—	—
June	165	51,561	52	47,000	532	120,424	45	16,649
July	93	26,000	24	17,463	45	102,325	—	—
Aug.	50	14,000	11	5,600	766	168,511	—	—

Reclaimed Rubber in the United States

(All Quantities in Long Tons—100% Basis)

Year	Production	Consumption Tons	Consumption % to Crude	Stocks*	Year	Production	Consumption Tons	Consumption % to Crude	Stocks*
1920	86,195	75,297	28.4	.....	1925	132,930	137,105	35.6	13,203
1921	36,725	41,351	24.1	.....	1926	180,582	164,500	45.9	23,218
1922	57,854	54,458	19.3	.....	1927	189,144	178,471	47.6	24,980
1923	74,766	69,534	22.7	.....	1928	208,516	223,000	50.4	24,785
1924	80,079	76,072	22.4	.....	1929	218,954	226,588	48.4	27,464
1928:									
Jan.	14,862	20,140	58.5	21,941	July	17,278	19,070	51.0	17,305
Feb.	15,291	18,670	55.4	20,848	Aug.	19,049	17,890	41.7	15,881
Mar.	17,049	20,680	57.9	19,558	Sept.	18,693	17,795	44.6	17,991
Apr.	15,393	19,280	58.8	19,283	Oct.	17,182	18,420	45.1	17,026
May	18,945	20,215	54.1	18,137	Nov.	18,245	18,380	49.1	22,399
June	18,781	18,140	48.2	18,709	Dec.	17,728	14,320	45.9	24,785
1929:									
Jan.	18,685	21,068	49.1	24,394	July	18,387	20,236	48.7	19,679
Feb.	18,094	19,829	47.7	23,305	Aug.	19,787	18,230	47.6	22,309
Mar.	19,984	20,867	46.7	22,076	Sept.	18,660	17,071	49.2	24,984
Apr.	19,809	22,435	47.3	20,680	Oct.	18,865	18,744	53.8	25,117
May	20,385	23,176	47.1	19,479	Nov.	14,363	15,330	55.4	26,080
June	18,416	18,141	42.0	17,980	Dec.	13,429	11,531	49.0	27,464
1930:									
Jan.	15,010	17,454	47.6	24,241	July	12,322	12,384	42.3	23,873
Feb.	15,846	14,559	44.5	24,243	Aug.	12,047	10,985	35.9	22,980
Mar.	17,400	15,241	42.2	24,415	Sept.	.....	.....	.....	.....
Apr.	17,828	16,904	42.9	24,587	Oct.	.....	.....	.....	.....
May	17,812	17,052	42.7	23,356	Nov.	.....	.....	.....	.....
June	15,714	14,063	40.8	24,449	Dec.	.....	.....	.....	.....

*Stocks on hand at the end of month or year. Exports of reclaimed rubber, not shown in this table, amounted to 8,540 tons in 1927, 9,577 tons in 1928, and 12,369 tons in 1929.

U. S. Consumption of Gasoline

(In Barrels of 42 Gallons)

MONTHS	1929	1930	MONTHS	1929	1930
January	22,602,000	25,731,000	July	36,860,000	38,256,000
February	22,776,000	26,509,000	August	37,759,000	37,433,000
March	28,495,000	31,029,000	September	34,193,000	
April	32,019,000	34,549,000	October	32,816,000	
May	34,117,000	36,497,000	November	31,502,000	
June	33,162,000	35,902,000	December	26,550,000	

REVIEW DESK

Books, New Publications, Catalogues, Etc.

A Brief Outline of Three Economic Catastrophies in a Great Country. By Eliot Norton. Privately Printed. 1930. 14 pp.

The author ascribes the slow development and poor buying power of Brazil to three "economic catastrophies," namely, those of gold, rubber and coffee. He fails to acknowledge the fact that Brazil would eventually have had to lose her supremacy in rubber whether or not "an Englishman smuggled some seeds" out of that country, just as Brazil itself captured the coffee growing industry from the Far East. He does not mention the work begun on the huge Ford concession, but takes it for granted that "the milk has been split—the loss is an irrevocable fact." His summaries, however, present the fundamental facts in each case interestingly for the reader unacquainted with the subject.

Brown Pyrometers. Published by the Brown Instrument Company, Philadelphia, Pa. 1930. 104 pp. For free distribution.

The economies and increases in efficiency to be optained from the use of good pyrometers is now appreciated in industry. This catalog contains a comprehensive resumé of the theory and practice of applied pyrometry, together with descriptions and illustrations of all instruments, thermocouples, protecting tubes and other required equipment. It includes 141 illustrations, many of which are in two or more colors.

Twenty Years with Micronex. Published by the Binney & Smith Company, 41 East 42nd Street, New York City. 1930. 14 pp. For free distribution.

Carbon black was first employed in rubber in a special cord tire, developed in England twenty years ago. The growth of its use since that time is traced in this illustrated booklet, featuring particularly the laboratory research work done by the Binney & Smith Company itself.

Barnstead Automatic Water Stills. Published by the Barnstead Still and Sterilizer Company, Inc., Lanesville Terrace, Forest Hills, Boston, Mass. 1930. 90 pp. For free distribution.

Distilled water is essential in various manufacturing processes under laboratory control, and proper equipment for this purpose is highly important. This handbook describes the types of stills used for various industrial purposes, explains the operation of each type, and includes much instructive information. Illustrations of installations in rubber and other factories are included.

Hand Tool Accidents: Their Cause and Prevention. By Robert B. Northrup. Published by the Bureau of Industrial Hygiene, New York State Department of Labor, 124 East 28th Street, New York City. 1930. 48 pp. For free distribution.

Innumerable and unnecessary accidents result from the improper use and care of hand tools. In New York, 7,389 persons received compensation in one year for injuries from hand tools. The author of this volume concludes from actual tests made at New York University that the low-priced tool is very extravagantly high in cost, a cheap hammer, for example, costing nearly 22 times as much as an expensive hammer in point of service.

Industry's Age of Reason. By Magnus W. Alexander. Published by the National Industrial Conference Board, Inc., 247 Park Avenue, New York City. 1930. 50 pp. For distribution to members.

In this report is an address by Mr. Alexander, interpreting the significance for industry and for society of the rise of the new ideal of voluntary co-operation, an account of the research and information services rendered by the Conference Board during the fiscal year ended April 30, 1930, and lists of the board's membership and officers.

Code for Lighting Factories, Mills and Other Work Places. Published by the American Standards Association, 29 West 39th Street, New York City. 1930. $.20.

Savings effected in economy of production by good illumination are a significant item to the factory owner. The code contained in this volume, which applies to practically all industries, is intended as a guide for factory owners and operators in their efforts to improve lighting conditions in their plants.